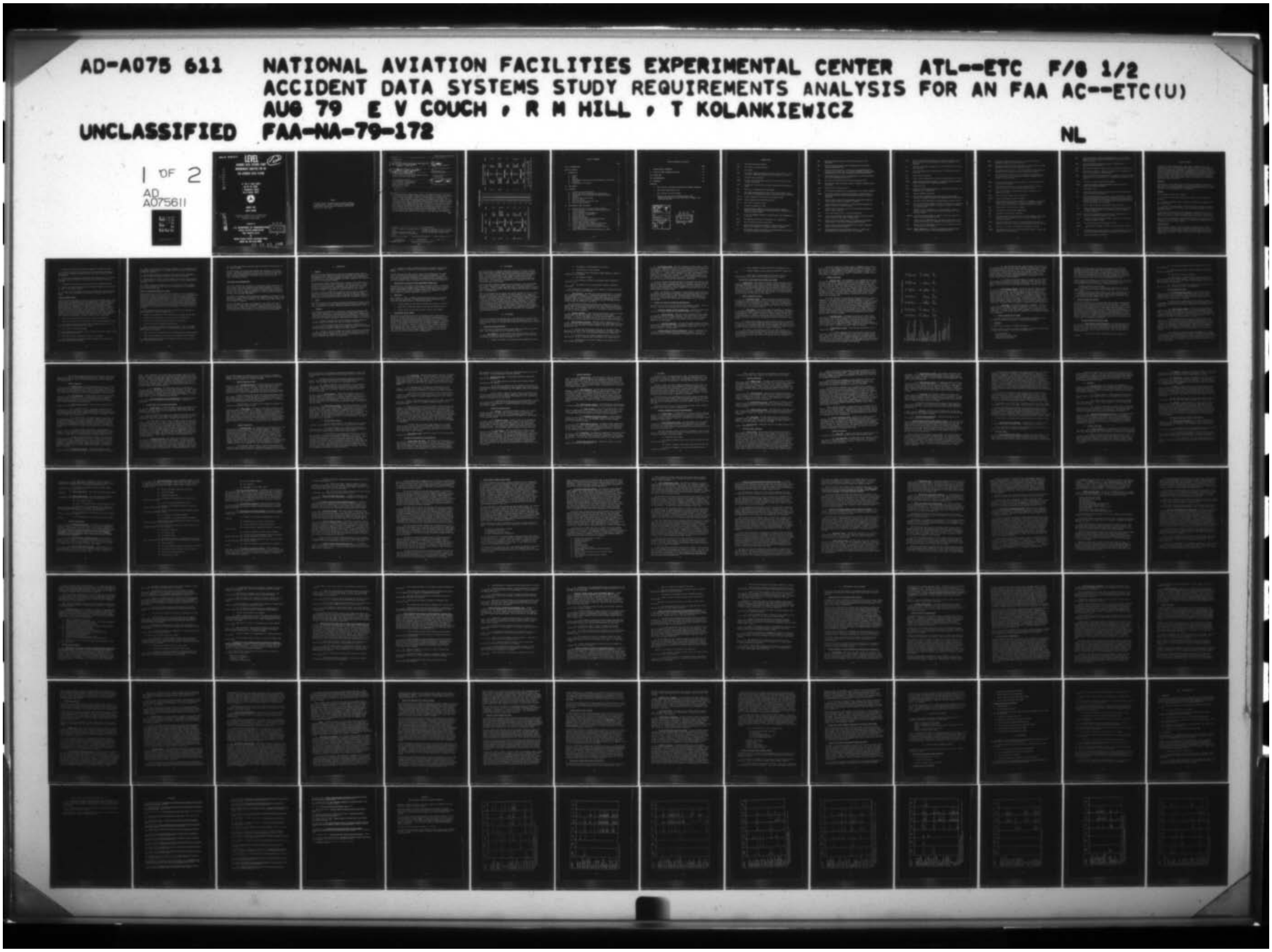
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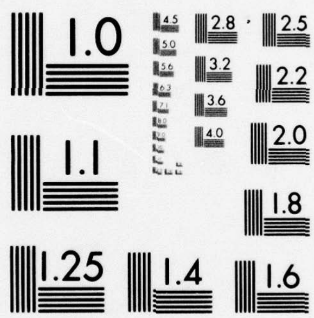


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Report No. FAA-NA-79-172

LEVEL IV

12

# ACCIDENT DATA SYSTEMS STUDY
# REQUIREMENTS ANALYSIS FOR AN
# FAA ACCIDENT DATA SYSTEM

AD A075611

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DEPARTMENT OF TRANSPORTATION · UNITED STATES OF AMERICA

AUGUST 1979
NAFEC REPORT

Document is available to the U.S. public through
the National Technical Information Service,
Springfield, Virginia 22161.

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Prepared for

**U.S. DEPARTMENT OF TRANSPORTATION**
**FEDERAL AVIATION ADMINISTRATION**
**Flight Standards Service**
By
**National Aviation Facilities Experimental Center**
**Atlantic City, New Jersey 08405**

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**Technical Report Documentation Page**

| 1. Report No. | 2. Government Accession No. | 3. Recipient's Catalog No. |
|---|---|---|
| FAA-NA-79-172 | | |

4. Title and Subtitle
6 ACCIDENT DATA SYSTEMS STUDY REQUIREMENTS ANALYSIS FOR AN FAA ACCIDENT DATA SYSTEM

5. Report Date
11 Aug[redacted]79

6. Performing Organization Code

7. Author(s)
10 [redacted] Ellis V. Couch, Ron M. Hill, Ted Kolankiewicz, Gerald Skelton

8. Performing Organization Report No.
14 FAA-NA-79-172

9. Performing Organization Name and Address
Federal Aviation Administration
National Aviation Facilities Experimental Center
Atlantic City, New Jersey 08405

10. Work Unit No. (TRAIS)

11. Contract or Grant No.
014-100-100

12. Sponsoring Agency Name and Address
U.S. Department of Transportation
Federal Aviation Administration
Flight Standards Service
Washington, D.C. 20590

240 550

13. Type of Report and Period Covered
9 Final rept.
Oct[redacted]77—Jul[redacted]79

14. Sponsoring Agency Code

15. Supplementary Notes
12 168

16. Abstract

The Federal Aviation Administration (FAA) is investigating possible improvements in its accident data system to enhance aviation safety. The present data system is limited in scope, difficult to use, and of little benefit to aviation safety analysts. This requirements report analyzes the immediate needs which can be met in the near term as well as improvements which will necessitate extensive changes in data collection forms, procedures, and methodologies. This analysis includes an examination of other similar data systems, a review of previous related studies, and a survey of recommendations from users of accident data systems. The FAA Flight Standards Service has incorporated additional data elements, improved software for better data access, and other near term improvements in the General Aviation Accident Data System (GAADS) now under development. These improvements are evolutionary steps toward the fulfillment of the long range requirements.


| 17. Key Words | 18. Distribution Statement |
|---|---|
| Aircraft accident data system requirements<br>Automated aircraft accident data<br>Accident information system improvements | Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161 |

| 19. Security Classif. (of this report) | 20. Security Classif. (of this page) | 21. No. of Pages | 22. Price |
|---|---|---|---|
| Unclassified | Unclassified | 128 | |

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

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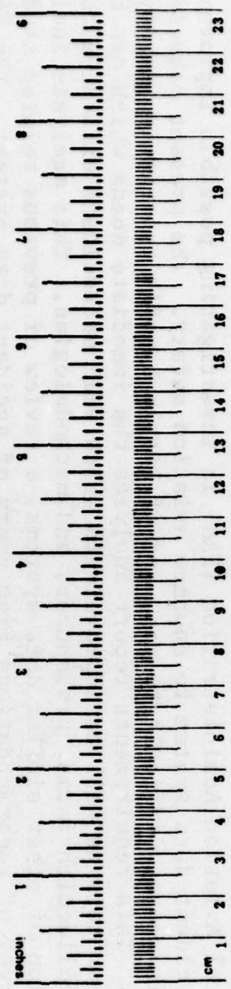
# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

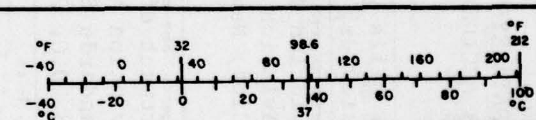
| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| in | inches | *2.5 | centimeters | cm |
| ft | feet | 30 | centimeters | cm |
| yd | yards | 0.9 | meters | m |
| mi | miles | 1.6 | kilometers | km |
| | | **AREA** | | |
| $in^2$ | square inches | 6.5 | square centimeters | $cm^2$ |
| $ft^2$ | square feet | 0.09 | square meters | $m^2$ |
| $yd^2$ | square yards | 0.8 | square meters | $m^2$ |
| $mi^2$ | square miles | 2.6 | square kilometers | $km^2$ |
| | acres | 0.4 | hectares | ha |
| | | **MASS (weight)** | | |
| oz | ounces | 28 | grams | g |
| lb | pounds | 0.45 | kilograms | kg |
| | short tons (2000 lb) | 0.9 | tonnes | t |
| | | **VOLUME** | | |
| tsp | teaspoons | 5 | milliliters | ml |
| Tbsp | tablespoons | 15 | milliliters | ml |
| fl oz | fluid ounces | 30 | milliliters | ml |
| c | cups | 0.24 | liters | l |
| pt | pints | 0.47 | liters | l |
| qt | quarts | 0.95 | liters | l |
| gal | gallons | 3.8 | liters | l |
| $ft^3$ | cubic feet | 0.03 | cubic meters | $m^3$ |
| $yd^3$ | cubic yards | 0.76 | cubic meters | $m^3$ |
| | | **TEMPERATURE (exact)** | | |
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.




## Approximate Conversions from Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | | **LENGTH** | | |
| mm | millimeters | 0.04 | inches | in |
| cm | centimeters | 0.4 | inches | in |
| m | meters | 3.3 | feet | ft |
| m | meters | 1.1 | yards | yd |
| km | kilometers | 0.6 | miles | mi |
| | | **AREA** | | |
| $cm^2$ | square centimeters | 0.16 | square inches | $in^2$ |
| $m^2$ | square meters | 1.2 | square yards | $yd^2$ |
| $km^2$ | square kilometers | 0.4 | square miles | $mi^2$ |
| ha | hectares (10,000 $m^2$) | 2.5 | acres | |
| | | **MASS (weight)** | | |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.2 | pounds | lb |
| t | tonnes (1000 kg) | 1.1 | short tons | |
| | | **VOLUME** | | |
| ml | milliliters | 0.03 | fluid ounces | fl oz |
| l | liters | 2.1 | pints | pt |
| l | liters | 1.06 | quarts | qt |
| l | liters | 0.26 | gallons | gal |
| $m^3$ | cubic meters | 35 | cubic feet | $ft^3$ |
| $m^3$ | cubic meters | 1.3 | cubic yards | $yd^3$ |
| | | **TEMPERATURE (exact)** | | |
| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |



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# ABBREVIATIONS

| | |
|---|---|
| AAF | FAA Airway Facilities Service |
| AAM | FAA Office of Aviation Medicine |
| AC | Air Carrier |
| ACDO | FAA Flight Standards Service Air Carrier District Office, a field facility to serve and regulate the locally based air carriers |
| ADP | Automated data processing |
| ADREP | Accident Incident Reporting System, the ICAO automated aircraft accident data system |
| ADSS | Accident Data System Study, the NAFEC program which produced this report |
| AED | FAA Office of Engineering and Development |
| AFS | FAA Flight Standards Service; that arm of the FAA which serves, certificates and regulates aircraft, airmen and aviation operations |
| AFS-50 | Flight Standards Service Accident Investigation Staff |
| AFS-60 | Flight Standards Service Evaluation Staff |
| AGC | FAA Office of General Counsel |
| AI | Accident Investigat(or) (ion) |
| AME | Aviation Medical Examiner, a physician specially trained to administer aviation physicals and perform medical examinations on aviation accident victims |
| AMS | Office of Management Systems, an administrative and management arm of the FAA |
| AOA-5 | FAA Communications Center in Washington D.C. headquarters |
| AOPA | Aircraft Owners and Pilots Association |
| APC | FAA Accident Prevention Coordinator, regional Flight Standards planner and coordinator of accident prevention programs |
| APS | FAA Accident Prevention Specialist, FSDO/GADO planner and executor of safety programs at the local level |

| | |
|---|---|
| ARC | NASA Ames Research Center at Moffett Field, Mountain View, California |
| ARM | FAA Rocky Mountain Region, the FAA headquarters in the Rocky Mountain geographical area |
| ASI | Aviation Safety Institute; a private safety organization which solicits error reports from the aviation community and makes safety recommendations to the FAA, manufacturers and operators/pilots |
| ASO | FAA Southern Region, the local headquarters for all FAA operations in the southeast geographical area |
| ASP | FAA Office of Aviation System Plans, planning arm of FAA |
| ASRS | NASA Aviation Safety Reporting System, a voluntary incident reporting system |
| ASTC | Airport Surface Traffic Control |
| ATA | Air Transport Association, an organization of air carrier companies |
| ATARS | Air Traffic Advisory and Resolution System, a future system to provide aircraft with traffic information and assist in conflict resolution |
| ATC | FAA Air Traffic Control; the procedures, operations and support systems which control the movement of aircraft |
| ATP | Airline Transport Pilot Rating, a certificate which permits the holder to fly in air carrier service |
| ATS | FAA Air Traffic Service, that arm of the FAA which provides air traffic control (see ATC) |
| AVS | FAA's newly-created Office of Aviation Standards |
| BASIS | A data base management logic package; written, used by and available from Battelle Institute, Columbus, Ohio |
| BCAS | Beacon Collision Avoidance System, an electronics and computer based system to avoid unsafe spacing between aircraft |
| CAB | Civil Aeronautics Board; the aeronautical, economic regulation agency of the Federal government |
| CAIS | FAA Comprehensive Airman Information System, a computerized information system containing data on U.S. airmen |

| | |
|---|---|
| CAMI | FAA Civil Air Medical Institute, the primary FAA medical research center located at the FAA Aeronautical Center in Oklahoma City, Oklahoma. |
| CAT | Clear air turbulence, turbulent air not associated with any obvious storm activity |
| CATA | Civil Air Transportation Administration, the Canadian counterpart of the FAA |
| CDC | Control Data Corporation |
| CFR | Code of Federal Regulations, the laws and regulations of the U.S.A. |
| COBOL | COmmon Business Oriented Language, a computer programming language useful in business and accounting applications |
| CRT | Cathode ray tube |
| CSSA | Center for Systems Safety Analysis, a safety analysis group at FAA Washington, D.C. headquarters |
| DEC | Digital Equipment Corporation |
| DSES | Data, Systems, Equipment and Services Plan, an FAA guideline document for design, development and implementation of ADP systems |
| DOT | The United States Department of Transportation, includes the FAA |
| EARS | Error Analysis Rating System; a method or rating of the significance of aviation errors according to frequency and severity, designed and used by the ASI |
| ELT | Emergency locator transmitter, a radio transmitter, carried in general aviation aircraft, which transmits automatically if the aircraft crashes |
| EXTRACTO | A software package designed to extract records from large data bases, offered commercially by IBM |
| FAA | Federal Aviation Administration, that agency within the U.S. DOT charged with promotion and regulation of aviation in the U.S.A. |
| FAR | Federal Aviation Regulations, that part of the CFR which pertains to aircraft and their operation |
| FORTRAN | FORmula TRANSlation, a computer programming language designed primarily for scientific and engineering applications |

| | |
|---|---|
| FSDO | FAA Flight Standards District Office, a field office with the combined functions of the ACDO and GADO |
| FSNFO | FAA Flight Standards National Field Office, a field office of Flight Standards located at the FAA Aeronautical Center |
| FSS | FAA Flight Service Station, an ATS office which provides ground and airborne weather forecasts and other services for aviation |
| GA | General Aviation; the aircraft, owners, pilots and operations for all purposes other than the regular commercial transportation of freight or paying passengers |
| GAADS | FAA General Aviation Accident Data System, a new FAA accident data system under development |
| GADO | FAA Flight Standards Service General Aviation District Office, a field facility to serve and regulate general aviation |
| GAIS | The FAA GA Accident Information System now in operation, to be replaced with GAADS |
| GAMA | General Aviation Manufacturer's Association |
| GIM II | A data base management software package |
| HM | Hazardous material; explosive, radioactive, flammable, corrosive or toxic cargo or baggage which is dangerous, especially in case of a crash; refers to an accident or incident where HM was a factor |
| IBM | International Business Machines Company |
| ICAO | International Civil Aviation Organization |
| IMC | Instrument meteorological conditions |
| MAC | FAA Maintainenance Analysis Center, a Flight Standards office which collects, stores and analyzes data on aircraft accidents and maintenance problems |
| MADS | Medical Accident Data System, an automated base of medical data derived from aviation accident victims, maintained and used by CAMI |
| MOT | Ministry of Transport, the Canadian counterpart of the DOT |
| NAFEC | FAA National Aviation Facilities Experimental Center, a primary FAA research and development site |

| | |
|---|---|
| NASA | National Aeronautics and Space Administration; a U.S. government organization for the research, development and exploration of aeronautics and space |
| NBAA | National Business Aircraft Association, an organization of executive aircraft operators |
| NMAC | Near mid-air collision, reports thereof and reporting system therefor |
| NPD | NAFEC Program Document, a guideline document for the expenditure of resources and timing of a NAFEC program |
| NTSB | National Transportation Safety Board, an independent government agency responsible for the investigation of transportation accidents in the U.S.A. |
| OSEM | FAA Office of Systems Engineering Management |
| PASCAL | A recently designed computer programming language intended to replace both COBOL and FORTRAN |
| RO | FAA Regional Office |
| RUS | A data base manager software package which served the ARM and ASO regional accident data systems |
| SDR | Service Difficulty Report; a report of any aircraft part or system which performed below standard; the substandard performance may have affected an aircraft's performance or have been discovered during routine maintenance; also the computerized system which aids in the storage and analysis of such reports |
| SER | FAA Air Traffic Service's System Error Reporting System |
| SIAS | Safety Information and Analysis System, an FAA sponsored overview of Flight Standards needs for information services in support of its several missions |
| SOLARAD | System of On Line Analysis and Retrieval of Accident Data, the automated accident data system of the NTSB |
| SPSS | A computer software package, available commercially from IBM, for statistical analysis of data |
| SRDS | FAA Systems Research and Development Service |
| TELEX | teletypewriter, message from same, or communications network of me |
| TSI | DOT Transportation Safety Institute; a training facility which offers courses in accident investigation, transportation security, etc. |
| VMC | Visual meteorological conditions |

## EXECUTIVE SUMMARY

The Federal Aviation Administration (FAA) Flight Standards Service (AFS) initiated this safety information system study as a means of determining both near-term and long-range requirements for improving its aviation accident data system. The long-range aspect allows recommendations to go beyond limitations of current systems, procedures, and methodologies and organizational constraints. This requirement analysis should be viewed concurrently with other on-going efforts to achieve improvements to the data system, particularly the General Aviation Accident Data System (GAADS), which as a ground rule are being implemented under these constraints.

### OBJECTIVE.

The objective of this analysis was to take a broad independent look at the FAA's needs for accident information, to establish requirements and make recommendations for system improvements. Specific consideration was given to what users need and the capabilities of other systems.

### APPROACH.

Three individual studies were conducted:

1. A review of previous FAA studies which related to safety information systems.

2. A survey to determine usage of available information and suggestions for system improvement.

3. A review of the capabilities of other major safety information systems including interviews with officials, users and operating personnel at various management levels.

It was found that systems such as the present little-used FAA system do not generate useful ideas from users for improvement. Therefore a great deal of reliance was placed on related studies and the capabilities of other systems.

Data from the system and user surveys were analyzed in conjunction with the results of previous studies to arrive at the conclusions, recommendations, and requirements set forth in this report.

### RELATED STUDIES.

There have been a number of prior FAA studies covering specific aspects of safety information systems, and the problems associated with them. These studies reflect the long-standing concern of the FAA to make the best use of vital safety information. Similar results have been reached in most cases. Examples are:

1. Accident and incident data should be combined in the same data base.

2. All accidents need not be investigated in the same detail depending on their severity. Manpower required for data collection for minor accidents is excessive.

3. Existing data systems are underutilized and ineffective due to difficulty of access, system inflexibility, non-current data, and insufficient user training.

4. Standardized coding should be used in all safety information systems.

5. The FAA and National Transportation Safety Board (NTSB) data bases should be merged to the degree possible.

6. There is a need for exposure data such as flight hours and aircraft population. Statistical approaches are also needed to identify safety problem areas.

USER REQUIREMENTS SURVEY.

Users of accident data within the FAA were surveyed to determine present usage of information and suggestions for system improvements. A questionnaire was mailed to approximately 140 offices; 90 responses were received. Telephone conversations were initiated with a sampling of nonresponding offices to gather additional information. The offices surveyed included all Flight Standards Regional Offices (RO's), Flight Standards and General Aviation District Offices (FSDO's and GADO's), FAA Research and Development, and other offices (such as Aviation Medicine) which use safety information. The questionnaire covered the data analysis qualifications of users, their familiarity with and use of various types of data, and suggestions for improvements in data collection and analysis. The major results of this survey were:

1. Most users have seen NTSB data. Few are familiar with FAA data.

2. Little use is made of any accident data in FAA decision making processes.

3. Most organizations do not utilize safety information because it is not easily accessible, understandable, and current.

4. Users lack data analysis training.

5. User personnel have few ideas on how to improve the present system, because of their unfamiliarity with it.

6. Users want incident information included in the system.

7. Field personnel want additional elements included in the data base to allow for one-time special studies.

8. Direct access to the data is not now available to all investigators and specialists. GADO personnel, for example, would like access to data peculiar to their own districts.

9. Many Accident Prevention Specialists (APS) and Accident Investigators (AI) had no formal specialized training, only on-the-job training.

10. Analysts want an accident narrative summary of specified length prepared by the investigator to be included in the data base. In most systems this is not done.

11. Several investigators suggested that the NTSB 6120.4 form be replaced with a quick response, multiple choice form containing all the information that the NTSB and FAA need.

SURVEY OF SIMILIAR ACCIDENT DATA SYSTEMS.

Major existing aviation safety systems were examined to evaluate desirable features which might be incorporated into an FAA system. The systems surveyed were those of the NTSB, International Civil Aviation Organization (ICAO), Canadian Air Transportation Administration (CATA), U.S. Navy, National Aeronautics and Space Administration (NASA), the present operational FAA system, the FAA'S new GAADS, and the system of the Aviation Safety Institute (ASI), a private organization. In each case, detailed interviews with system developers, operators and analysts were conducted using a structured interview, in addition to reviewing detailed system documentation. Results of this survey were:

1. Other systems collect much more data than FAA's, but at the cost of greater manpower and computer expenditures.

2. Adequate trend analysis and other statistical techniques are not used.

3. Computer input-oriented data collection forms are widely used.

4. Most systems do not have reports oriented for user needs.

5. Little use is made of graphical presentations.

6. Some of the major systems have current data bases. ICAO, for example, utilizes preliminary data derived from teletypewriter notices or even news media notices of accidents.

7. There is a lack of consistency for data coding among the various systems.

8. Some systems overemphasize data input at the expense of data analysis.

9. GAADS incorporates features which respond to many of the user requirements found during this survey.

10. The CATA system had the greatest number of desirable characteristics of all systems studied.

The survey showed that computerized accident data systems are not state-of-the-art. Systems are deficient in terms of data utilization and analysis. However, labor saving techniques were identified in the area of data collection. Responsive systems with current data, such as that of ASI, were found to be highly utilized.

## CONCLUSIONS AND RECOMMENDATIONS.

This study confirmed the conclusions of previous FAA studies which found the FAA's accident data system ineffective and underutilized due to system deficiencies. Other data systems surveyed provided background for improvements to FAA's system. There is substantial redundancy in the NTSB and FAA systems. The user requirements identified fell into two general categories, near-term and long-range improvements.

The study team recommends further near-term improvements to the GAADS. These improvements include better information flow, improved training, improved data base access, expansion of the data base, text (rather than coded) output, and use of graphics techniques.

For the long-range, the study team recommends a joint effort with NTSB to develop a single common safety information data base meeting the needs of both agencies. A common system should be compatible with the ICAO system, and have increased software power, a revised investigation form, additional user-requested data, and the ability to correlate with other data bases.

# I. INTRODUCTION

## A. PURPOSE.

The Federal Aviation Administration (FAA) Flight Standards Service (AFS) is examining the present system of accident data collection, processing, storage and subsequent use. This report presents an analysis of user requirements, an important first step toward management agreement, commitment, and subsequent solution of the identified problems.

The FAA collects accident and incident data in support of the safety mission prescribed by the FA Act of 1958. Computers have long been used to process portions of the data collected. Accordingly, this analysis does not assess the need or desirability of collecting or processing such data. Rather it addresses the needs for improvement in existing functions and services.

The type of accident information system which could satisfy the requirements identified herein may or may not resemble the system in operation today. Exactly how a future system will evolve is dependent on subsequent feasibility studies and system proposal phases which follow this requirements analysis.

## B. SCOPE.

This report covers all the accident and incident information of concern to the FAA. It encompasses air carrier and general aviation accidents and incidents such as near mid-air collisions (NMAC) and hazardous materials (HM) reports.

## C. APPROACH.

FAA procedures for documenting a requirements analysis are presented in FAA Order 1370.52 (Reference 1). As stated there, "A requirements analysis is a comprehensive and objective identification and evaluation of an organization's needs for information and for new or improved work procedures." In the case of accident and incident information, these needs were examined by conducting:

1. A review of specific cases where FAA safety studies attempted to utilize accident and incident data, and the problems encountered.

2. A review of previous FAA studies relating to identification of deficiencies in the existing accident and incident data systems, with emphasis on results which have direct bearing on the current issues.

3. A survey of users of accident and incident information to determine the degree of usage of present systems, the problems being encountered, and obtain suggestions for improvement in such areas as procedures and data collection, accessibility, output, and presentation.

4. A survey of similar information systems to determine features which might be candidates for inclusion in an improved FAA accident information system.

The data collected from these various sources were assimilated by the study team and the results are presented in terms of user requirements. In most cases, they are presented in high-level or functional terms, the specifics of possible implementation approaches are deferred to later feasibility study and system proposal efforts, as called for in FAA Order 1370.52 (Reference 1).

D. THE NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER ROLE.

Responsibility for the conduct of this effort was given by AFS to the National Aviation Facilities Experimental Center (NAFEC) through the Office of Systems Engineering Management (OSEM). NAFEC responded with a NAFEC Program Document (NPD), Accident Data System Study (ADSS), 01-412, later changed to 01-222, which proposed the approach described in section I.C.

E. MITRE ROLE.

Under contract to OSEM, the MITRE Corporation became involved in this study due to previous involvement in Flight Standards safety information system design and development projects. MITRE was directed to:

1. Provide guidance on the scope, direction, and content of the study.

2. Review and critique the results of the user and systems surveys.

3. Provide inputs from previous projects, surveys, and studies.

F. ORGANIZATION OF THE REPORT.

This report is organized as called for in FAA Order 1370.52 (Reference 1). Section II presents a description of the problem which necessitated the study. Section III (1) describes the difficulties the FAA has had in achieving its safety mission without an adequate accident information system, (2) discusses related factors influencing the study, and (3) reviews the results of previous efforts. Also included in Section III are the results of NAFEC's separate system and user surveys. Section IV presents the user originated requirements resulting from this study. Section V evaluates the impact of the results on other organizations, and Section VI discusses the effects of a new accident data system on other FAA data systems. Finally, Sections VII and VIII present the study team's conclusions and recommendations.

## II. THE PROBLEM

There has long been a recognized need within the FAA to find ways of making more effective use of accident and incident information for safety analysis. Many of the problems with the existing information system have been known for years. Near-term improvements to the system are being achieved through the General Aviation Accident Data System (GAADS). However, that work was intentionally limited in scope to objectives which could be attained easily and in-house. For instance, the continued use of existing data collection forms and procedures was assumed.

The question which remained unanswered then, was whether or not the FAA might wish to take dramatically different longer range steps toward significant improvements. Dramatic changes might take years to implement fully if concepts such as completely revised data collection forms and data processing procedures were to be implemented.

Some of the problems with the present FAA accident system are: (1) it is little used because outputs are too difficult to read and data are not timely, (2) personnel are not aware of the type of data available and are not adequately trained in appropriate analytical techniques, (3) excessive manpower is required to operate the system with respect to the benefits achieved, (4) the system is duplicative of other systems resulting in wasted resources, (5) confusion often arises because data derived from the FAA system may differ from data derived elsewhere, and (6) the FAA system has not kept up with the state-of-the-art of information systems. It was therefore a purpose of this analysis to more fully investigate these deficiencies and, where potential for improving the system does exist, identify these areas as the basis for a subsequent system feasibility study.

## III. BACKGROUND

This section discusses the organizational responsibilities for accident investigation and analysis, the uses of accident data, descriptions of other information systems, results of the NAFEC user survey and the relationship of previous studies.

### A. ORGANIZATION RESPONSIBILITIES.

Both the National Transportation Safety Board (NTSB) and the FAA use accident data. Their responsibilities and relationships follow.

1. FAA INTERESTS. The FAA accident information system was developed to support the primary FAA interests in aircraft accidents. These interests, as specified in FAA Order 8020.11 (Reference 2), are:

a. Possible violations of the Federal Aviation Regulations (FAR),

b. Performance of FAA facilities or functions,

c. Airworthiness of civil aircraft,

d. Competency of FAA certificated airmen, agencies, commercial operators, or air carriers,

e. The adequacy of FAR's,

f. The adequacy of airport certification safety standards or operations, and,

g. The adequacy of air carrier/airport security standards or operations.

The acquisition of information in direct support of accident prevention efforts is not specifically addressed.

2. NTSB INTERESTS. The NTSB was established (Reference 3) to investigate transportation accidents, to determine the probable cause of accidents, and to recommend to the FAA any actions which might avoid or alleviate the problem(s) which cause the accidents. Besides the investigation of all accidents, NTSB is charged with the additional role of furthering aviation safety through the prevention of accidents.

But approximately 5000 general aviation (GA) accidents occur in the United States each year, and the NTSB has never been staffed or funded consistent with this investigative workload. As a result, the NTSB investigates only the air carrier accidents, most of the fatal general aviation accidents, and others of special interest.

3. NTSB-FAA INTERFACE. Since the FAA is much better staffed and funded to investigate the many GA accidents, the NTSB and FAA have agreed (Reference 4) that NTSB may delegate to the FAA the investigation of certain accidents. In practice, FAA handles most of the nonfatal, and a few fatal, GA accidents, and FAA investigators are usually present at NTSB investigations.

4. NTSB INFLUENCE ON THE FAA. FAA Order 8020.11 (Reference 2) prescribes techniques and responsibilities consistent with NTSB desires and information needs. The principal constraints worked on the FAA by Public Notice-1 (Reference 4) are:

a. The accident investigation forms used by the FAA are those specified by the NTSB. These forms must be submitted to the NTSB and FAA has adopted them for its own use in recording and transmitting accident data.

b. The NTSB alone can determine probable cause; any causal consideration by the FAA is tentative and is referred to as a "causal factor".

c. Information on air carrier accidents is not entered into the FAA's accident data system.

5. FAA INCIDENT SYSTEM. There is a problem of overlap between the FAR definition of a mechanical failure or service difficulty and the FAA definition of an incident. FAR 121.703 calls for a Service Difficulty Report (SDR) of "any failure, malfunction, or defect in an aircraft that occurs or is detected at any time if . . . that failure, malfunction or defect has endangered or may endanger the safe operation of any aircraft." FAA Order 8020.11 calls for reporting as an incident "any incident . . . which threatened damage to property, aircraft, or possible injury to persons." The overlap of the incident, the SDR, and even the accident data bases may be significant.

The use of incident data has been limited, even though the number of incidents each year equals or exceeds the number of accidents. Prior to 1976, all incident reports were maintained manually by the Accident Investigation Staff (AFS-50) at FAA Headquarters. This was largely due to the inability of the Flight Standards National Field Office (FSNFO) to perform this extra work. The NTSB maintains no incident files.

Another consideration is the absence of some incidents from the FAA base. For example, many incidents are reported to the National Aeronautics and Space Administration (NASA) Aviation Safety Reporting System (ASRS) that are not reported to the FAA incident system. Aircraft operators and manufacturers also maintain incident data bases which, in many cases, are not coordinated with the FAA.

B. CURRENT FAA USES FOR ACCIDENT AND INCIDENT DATA.

Accident data are used for both analytical and management purposes. The data used are a function of the purpose and the extent of automation.

1. HISTORICAL GENERAL AVIATION ACCIDENT DATA. Historical accident data are used for special studies and one periodic analytical tabulation.

a. Special studies. These are usually requested by field, region or headquarters offices of Flight Standards. The search logic can do little more than identify the accidents in question and output a one line summary. Usually it is necessary to refer to the original case file for anything beyond the one line summary.

b. Recurrent analytical. All fatal accidents involving mechanical failures are tabulated semi-annually to determine a hazard index for the various types of mechanical failures. This tabulation is used as an input to the alerting function of the SDR system.

2. CURRENT GENERAL AVIATION ACCIDENT DATA. There is considerable FAA interest in current accident data, even though preliminary. These data are usually collected at FAA headquarters by telephone and teletypewriter.

a. A daily summary is prepared by AFS-50 for headquarters use.

b. A monthly summary is also prepared by AFS-50 for headquarters use.

c. A daily fatal accident summary is prepared by the FAA Communications Center (AOA-5) and distributed daily to all regions.

C. <u>DESCRIPTION OF THE PRESENT FAA ACCIDENT DATA SYSTEM.</u>

1. <u>SYSTEM ORIGIN</u>. The present FAA General Aviation Information System (GAIS) was adopted in the early 1960's. During an extensive in-house data requirements assessment, users requested more than 700 data elements. However, the data system manpower allocated could not handle the review and coding of 700 elements and a compromise was made with the use of about 50 data elements and 20 outputs. A system then in use by the U.S. Army was adopted. An International Business Machine (IBM) 7040 computer at the FAA Aeronautical Center maintains the data base for the system.

2. <u>MANUAL PROCESSING OF DATA</u>.

a. <u>Preliminary Report</u>. Within 5 days of the accident the FAA Maintenance Analysis Center (MAC) should receive NTSB form 6120.19 which is a preliminary report summarizing the accident. From this form enough data are digitized on tape to identify the accident. This file is used only as an accounting tool to identify the final reports which have not been received. It is not usable for an accident inquiry.

b. <u>Final Report</u>. After the accident investigation is completed the records are assembled into an accident package. The original is submitted to the appropriate NTSB regional office and a copy is sent to the FAA's MAC at Oklahoma City. The contents vary with the type of accident and the extent of the investigation. Among the contents may be special reports, such as autopsies and other medical data, and engineering reports on failed or suspect parts.

The primary report medium for general aviation accidents is the NTSB form 6120.4. Other forms are sometimes included; for instance, form 6120.4.2 is required for aerial application/crop control accidents, form 6120.4a is used to report mid-air collisions, form 6120.1 is for submission of report by pilot/operator, and form 6120.11 provides for statement of witnesses.

The accident report package, primarily the NTSB form 6120.4, is scrutinized by an accident analyst at MAC. Any errors are coordinated with the investigator who wrote the report. About fifty pieces of information are extracted from the report and coded with an optical character typewriter for computer input.

The analyst exercises a certain amount of judgment in the selection of the codes for the different fields that best describe what happened. The most critical of these judgments is the selection of one or two causal factors. This is a grave responsibility for the analyst who proposes a causal factor based solely on the contents of the report. No narrative, or summary thereof, is carried in the computer record.

3. COMPUTER OPERATIONS.

a. Computer Input. The information to be automated has been typed with optical characters. The record sheet(s) is (are) scanned with an optical character reader and the digitized data are written on magnetic tape. This is an "update tape" and the fields in the record are not in the same format as those on the "master tape." The "update tape" is an input to the update process. The fields are reordered into the "permanent" format and the new accident report record is added to the "master tape." This process usually is executed biweekly. A listing of the newly created accident records is printed during the update process. A few gross errors in the record will cause a "warning flag" on the listing or stop the process, but most errors will be carried forward onto the master tape.

The input features of this system are included in Table 1 on page 8. Preparation of the code sheet requires frequent reference to a code book (Reference 5) as different choices for the several fields are reduced to single characters. The choices that must be made for some fields require interpretation of the report which can be done only by an analyst knowledgeable in aviation. The manual process of optical character typing is required prior to computer entry. The only effective quality control is accomplished by the reviewing analyst. The master record is updated every 2 weeks. However, the reports being entered may concern accidents which occurred some 3-12 months earlier. Same accidents require, for instance, engineering or mechanical analyses which can be very lengthy.

b. Data Extraction. The system can extract all reports which occurred in a given time period and present their contents in one of several fixed formats. This is done routinely. The system can also search for certain fields equal to a specified value and present the contents of the selected reports in the same fixed formats. Generally, the system cannot select records using a combination of field values without special programming of the system logic. Likewise, the output formats are limited.

c. System Output, Routine. Three periodic publications are produced by the system.

(1) Monthly summaries consist of the reports entered in the last month. Each report is summarized in a single line on computer printer paper. Generally, the values of the several fields are reproduced literally and reference to a coding book or intimate knowledge of the coded values is required to read and interpret the report. The same reports are sorted several different ways, once by aircraft make and model and again by region of occurrence, and are printed once according to each sorting.

# TABLE 1. AIRCRAFT DATA SYSTEMS COMPARISON

| INPUT | FAA | NTSB | ARM | ASO | USN | ICAO | CATA |
|---|---|---|---|---|---|---|---|
| #Data Elements Recorded | 397 | 397 | 397 | 397 | ? | 278 | 775 |
| #Data Elements Entered (Prelim/Final) | 1/65 | 0/237 | 0/31 | 0/23 | 0/213 | 30/278 | 78/393 |
| Full Narrative | No | No | No | No | Yes | Yes | Yes |
| Coding | Yes | Yes | Yes | Yes | Yes | Yes | No |
| Interpretation | Yes | Yes | Yes | Yes | Yes | ? | No |
| Key Punch/OCR | Yes | Yes | No | No | Yes | No | No |
| Quality Control (Manual, Computer) | M | M/C | M | M | M | M/C | M/C |
| Update Frequency (Daily, Wkly, Monthly) | 2W | 3M | W | W | D | W | D |
| **OUTPUT** | | | | | | | |
| Routine: Frequency[1] | M Q A | .2A A B | M | | many | M | W 2M A |
| Format (Coded, Text, Graph) | C C T | T T T | G | | C&T | T | T T T |
| Special: | | | | | | | |
| Response Time (Weekly, Hourly) | 6W? | 2H | 2H | 2H | 1H | 2H | 2H |
| Response Method | mail | mail | local | local | mail | local | local |
| Parameters | most | any | any | any | any | any | any |
| Format[2] | FT | FT | FT/G/St | FT | VT/St | VT | VT/St |
| Graphics Capability | No | No | Yes | No | No | No | No |
| Statistical Analysis | No | Yes | Yes | No | Yes | No | Yes |
| **Processing** | | | | | | | |
| Computer Type | IBM(3) | IBM360 | CDC6000 | CDC6000 | HW2040 | IBM360 | IBM360 |
| Data Storage | T | T | D | D | T | T | T |
| Language (ASM=assembly C=COBOL F=FORTRAN) | ASM/C | C | C&F | C&F | C | C | C |
| Maintainability (Poor, Fair, Good) | P | F | G | G | F | G | G |

OTHER ABBREVIATIONS

1
W=weekly M=monthly
Q=quarterly A=annual
B=blue book (NTSB special report for major accidents)

2
FT=fixed tabular G=graphical
St=statistical output VT=variable tabular

(2) Quarterly matrices list certain criteria (row headers) on the left margin and other criteria (column headers) across the top. The number of accidents reported in the last quarter that meet two simultaneous criteria can be found at the intersection of a row, e.g., the number of piston engine aircraft, and a column, e.g., a calculated risk accident. Again, 3 or 4 different breakdowns of the same reports are presented. The row and column headers are generally easier to understand without decoding than the field values printed in the monthly summaries.

(3) An Annual Statistical Summary is transferred from computer printer paper and presented as a booklet. Several different aspects of that year's aircraft accidents are presented statistically, e.g., the number and percent of different personal acts, types of accidents, accidents per region, etc.

d. <u>System Output, Special</u>. The MAC also executes unique searches of the data base to accomodate special requests for data not derivable from the routine publications. The response time is usually six weeks or more because the computer logic must be reprogrammed to perform a special search and/or to produce different output formats. If the identical search has been performed before, and the logic saved, a 2-3 day response is possible. The output, usually on computer printer paper, is mailed to the requestor. The system can be made to search on any value of a specified field. Without additional reprogramming, special system outputs are in a tabular format which is invariable. The system offers no graphics or statistical analysis capability.

e. <u>Processing</u>. The present system uses 3 computers. The data records are stored on magnetic tape and retrieved by an IBM 7040. One output routine runs on an IBM 1401, another on an IBM 370. Most of the store and search logic is written in the 7040 assembly language. The logic is difficult to maintain. All logic changes require a rewrite of the 7040 assembly language and a reassembly.

4. <u>DETAILED DESCRIPTION OF SYSTEM</u>.

A complete description of the current FAA accident information system, including all forms and instructions, is contained in Reference 6.

D. <u>INCIDENTS</u>.

The definition of incidents is complex (Reference 2).

Aviation incidents are events in which the damages or injuries are insufficient to qualify as an accident. Some types of incidents are:

- air carrier (AC)
- general aviation (GA)
- near mid-air collision (NMAC)
- hazardous materials (HM)

Information for these events is typically collected at the local Flight Standards or General Aviation District Office (FSDO or GADO) using the appropriate data collection forms. The information collected is generally very similar to that collected for accidents, particularly with respect to the factual data, although usually the investigative analysis is less extensive. In part, this is due to the fact that many incidents are reported as the result of phone calls, with no field investigation by the FAA.

Several studies have examined the present FAA incident system, the flow of data, and recommended ways of improving it. These are described in Section III. H. Some conclusions related to the present requirements analysis are:

- incidents should be better defined,
- the FAA NMAC file should be interfaced with others, such as the Air Traffic Service System Error Report (SER) and NASA ASRS files, to associate related events,
- hazardous materials incidents should be tied into other Department of Transportation (DOT) hazardous materials incident reporting systems, and ,
- incidents from other sources such as air carriers, manufacturers, and foreign countries should be added to the system.

## E. SURVEY OF OTHER DATA SYSTEMS.

As described in Section I. C., the NAFEC ADSS team conducted a comprehensive survey of the major existing aircraft accident data systems. The knowledge of how others have designed and operated accident data systems proved useful. The survey provided sample outputs of operational advanced systems for inclusion in the user questionaire. The survey insured that recommendations for improvements to the FAA system are based on working hardware and software and are both realistic and economically feasible. Operating personnel of other systems described their problems with development and operation and suggested means to avoid them. A summary description of each major system follows. In addition to these descriptions, a comparison matrix of the data elements used in the systems is contained in Appendix A.

### 1. NATIONAL TRANSPORTATION SAFETY BOARD.

a. Origin, Goals, and Characteristics. The NTSB automated accident data system was begun in the early 1960s, at about the same time as the FAA GA system. Since the NTSB is responsible for determining the probable cause of an accident, the selection and quantity of data in each digitized accident record is different from the FAA system. Major characterstics of NTSB's system are:

(1) Both air carrier and general aviation accidents are included.

(2) Many more data elements than FAA's system can be coded for each event.

(3) General aviation and air carrier incidents of particular interest are included.

(4) Some foreign events are included.

(5) Events are not available from the data base until the Board has determined the probable cause(s). This may occur as long as 6-12 months after the accident. Also, data tapes are made available to requestors only in calendar year increments.

(6) There are differences in coding between the NTSB and the FAA, e.g., in their definitions of an air taxi operation.

b. Manual Processing of Data.

(1) Preliminary accident reports. Initial notification of NTSB Headquarters that an accident occurred is by phone. Within 5 days, a preliminary written report (NTSB form 6120.19) must be sent to the NTSB regional office. This report is the primary "official" description of the accident until the final report is complete.

The NTSB accident system software has provision for entry of an incomplete record based on the 6120.19 form, but the data elements are not entered into the system until the final accident report is received at NTSB Headquarters.

(2) Final accident reports. As soon as the investigation is complete, the final report package is sent to the appropriate NTSB regional office. This package may contain several forms and much additional information as described for the FAA system in Section III. C. 2. b. The principal document is the NTSB form 6120.4. A copy of the report package is sent to the FAA FSDO or GADO which has responsibility for the event.

An NTSB regional office analyst uses the NTSB coding manual (Reference 7) as he extracts information, primarily from form 6120.4, and codes it onto NTSB form 2120.12 in preparation for card punching. For some accidents, for example, one involving a single engine aircraft with retractable gear, full instrument flight capability, a pilot and one passenger, a maximum of 397 data elements could be listed on the form 6120.4. The NTSB analyst could enter a maximum of 237 of these elements on the coding form 2120.12.

The analyst must exercise professional judgment in selecting values from a list of standard choices for coding. The most critical judgment is the choice of accident cause/factors because the Board members usually adopt as the probable cause of the accident one of the cause/factors chosen by the analyst. The analyst also summarizes the narrative, which can contain a maximum of 98 characters.

The completed coding form 2120.12 and the original report package are then forwarded to NTSB Washington Headquarters. There the package and coding are reviewed for errors before cards are punched from the coded form for computer entry.

c. Computer Operation.

(1) Computer input. The punched cards are read by card reader and the images are processed as a remote batch job by the host computer. The system logic is modularized by function. The edit logic checks for unacceptable codes, missing required data, and injuries to passengers and crew. Errors and invalid data are identified by card and column number for easy correction.

(2) Data extraction. The NTSB system can search for and select accident records with specific data or combinations of data. A maximum of 200 questions can be asked during a search, including multiple parameters within a specific question. The accident records selected can be processed several ways as discussed under system output.

(3) System output, routine. Several periodic publications are produced by the system.

(a) Bimonthly briefs. A collection of about 900 brief descriptions of recent accidents is issued approximately every two months. The document contains both English language summaries of the accidents formatted from the automated records by the computer, and a number of statistical views of the accidents under consideration.

(b) Annual review. Two annual reviews are published, one for GA accidents and one for air carrier accidents. These documents contain no briefs of accidents. They contain statistical presentations of the year's accidents and a few pages of analytical overview of the particular problems and trends that distinguished that year from previous years. The tables and correlations are produced by the analytic table program and by the cause factor program.

(c) Board or "Blue Book" review. The investigation of each air carrier or newsworthy accident results in the publication of a special document. The investigation is meticulous and the Board devotes most of its attention to these reports. Their preparation is largely a manual effort.

Two special programs produce the numeric and statistical outputs. The analytic table program will produce a variety of matrix tables using different x and y parameters such as x = type of accident, y = extent of damage. This program offers some output format options. The cause/factor program will calculate and output in a fixed tabular format the incidence of causes and related factors vs. either number of accidents for that cause or number of injuries.

(4) System output, special. The NTSB Information Systems Division will execute special inquiries for clients with interest in aviation

safety. Other requestors, such as law firms, can purchase copies of the data tapes. A different set of job control and request cards is required for each operation. These are retained and a large file contains control cards for most requests. The remote batch inquiry results are usually returned to the printer in two hours. The output usually is mailed to the requestor. The system can search on most parameters and the same output format possibilities exist as described under "System output, routine". The system has no graphics and only a limited statistical analysis capability.

(5) Processing. The system logic runs in the DOT IBM 360 Model 65 computer. The data base is entirely tape resident. The record format is sequential, NOT indexed sequential. The system is written in COBOL. Logic changes are required to generate new output formats and perhaps a few unusual search requests. Logic changes must be effected by batch submission of source changes which involve a new compilation and assembly.

d. Detailed Description of the NTSB System. A detailed description of the NTSB system, including all forms and instructions is contained in Reference 8.

## 2. INTERNATIONAL CIVIL AVIATION ORGANIZATION.

a. System Origin. The ICAO Accident Data Reporting (ADREP) system was entirely a manual operation in the late 1960s. Member states reported accidents to ICAO and a few of the more significant were selected each year for analysis and publication.

When ICAO decided to automate their system they surveyed the systems of NTSB, FAA, and others. Their intent was to design a system that was compatible with others, principally NTSB's. Analogies are discussed later.

Since their objective was to serve all member states, certain limitations had to be applied. To limit the size of the data base and concentrate on the more significant events, only accident and incident reports involving multi-engine aircraft over 2,250 kilograms (5,000 pounds) are included. Each year about 1,000 such accidents occur world wide. ICAO receives reports on about 800. Incidents involving aircraft in this same category are included if submitted. Events involving lighter aircraft or single-engine aircraft of any weight are not accepted. All member states must adhere to certain investigation criteria and submit reports coded onto a standard form according to an ICAO code manual. Member states may use their own investigation and recording forms.

b. Analogies With NTSB. Some commonality with NTSB was intended. The selection of cause/factors and the specification of a first and second occurrence coincide with NTSB practice. The "circle a picture" description of the aircraft attitude before impact and at rest are similar. However, the ICAO description of the orientation of departing or landing aircraft relative to the (intended) runway differs from that of NTSB. The ICAO system provides for entry and updating of preliminary data. The NTSB system does not. Many

ICAO and NTSB elements are similar, but not as the result of a deliberate attempt. ICAO records more data elements per event. Software and data base similarities and differences are discussed elsewhere.

c. Manual Processing of Data.

(1) Preliminary reports. The ICAO accident staff constantly searches the major news media for aircraft accident reportings, and when one is found, it is entered into the data base. This is referred to as an "unofficial information" report. It creates a record for the accident, allocates a report number, serves to identify the accident uniquely, and provides the means to check on the submission of the report by the member nation.

Within 30 days of the accident the investigating member nation must submit to ICAO, as a preliminary report, the first four pages of the complete standard report form. This contains basic information, for example, time, place, make/model, registration, type of operation, type of occurrence, damage, injuries/fatalities, and a brief narrative.

This information is entered into the computer and updates the "unofficial information" report, if any.

(2) Final report. The final or data report is mailed to ICAO Headquarters when the investigation is complete. This may take as long as a year. However, the data report can be submitted in lieu of the preliminary report if the investigation is completed quickly. The submitting member state codes the data report onto the official ICAO coding sheet according to the ICAO coding manual. This requires some interpretation by an aviation analyst. Each field on the form carries both the coded choice and a French, English or Spanish interpretation of the choice. The data report is not quality-checked before computer entry, but the computer logic has some error checking built in.

d. Computer Operations.

(1) Computer input. The accident data are entered into the computer directly from the coded form via a keyboard terminal. Unlike most accident data systems, ICAO uses an "intelligent" terminal. Their unit has storage, memory, and logic. A cathode ray tube (CRT) is used to preview entries and display responses. A medium speed printer is attached to provide hard copies as needed. When the operator indicates a record is to be input, the logic initiates a conversational inquiry on the CRT. The logic requests each numbered blank on the coded forms in sequence. When the operator responds with the coded value, the logic presents the equivalent "full language" choice on the CRT in English, French and Spanish so the operator can compare it with the "full language" for that field supplied by the coder.

This minimizes clerical errors. The data entry program also performs a quality control function by running certain consistency and logic checks for some of the data entered. Unofficial, preliminary, and final reports

all are entered into the intelligent terminal when received and stored there until the master file is updated from the intelligent terminal, usually once a month.

The input features of the system are summarized in Table 1, page 8. The ICAO code sheet provides for 278 data elements and each can be entered. Thirty elements can be entered as a preliminary report.

The system provides for a full narrative. It is carried in a separate file and related to the body of the report by the internal system report number. Space is allocated for narrative in 1,000 character blocks; one block will contain most narratives. There is also space to list preventive action taken.

(2) Data extraction. Records with specified values of any specified fields can be selected. One search can encompass a variety of desired parameters in combinations. A separate program performs cause/factor searches. The selected reports can be printed in brief or long form, or specified parts can be included/omitted. At the time of the ADSS team visit, the ICAO system could not do statistical processing although it was planned for the near future.

(3) System output, routine. Each month, ICAO prints a collection of briefs. Each is a half page summary of an accident for which at least the preliminary report is in, and which has occurred since the last monthly printing. The briefs contain roughly the information in the preliminary report even if the data report has been entered. The report contains only text and no coding. All ICAO reports are printed on 8 1/2 x 15 inch computer printer paper. Two of these printer pages can be reduced much easier than the more common 11 x 15 inch paper to fit on an 8 1/2 x 11 inch page. An annual statistical digest is planned.

(4) System output, special.

(a) Full report printouts. Any member state can request a complete text printout of all their reports for a specified time period.

(b) Special reports. All accidents that occurred in a specified time span, and with any combination of other qualifying variables, can be selected. Either briefs or full reports can be printed.

If the reports to be scanned are resident in the intelligent terminal, the search can be performed immediately. If main file data are involved the search must be performed by the main frame computer. This is an online batch operation. The job is submitted through the intelligent terminal. The data tapes must be loaded and the data placed temporarily on disc during the search. Other conversational inquiries can be made while the data base is on disc. The search and retrieval can be accomplished in half an hour. The output formats were fixed at the time of the ADSS team visit. Some sections of the reports or briefs can be omitted if desired. The system had no graphics or statistical analysis capability.

(5) Processing. The main frame computer, owned by the Canadian Ministry of Transportation (MOT), is an IBM 360 Model 65 in Ottawa, Canada. The data base is stored on tape but copied to disc during searching and data communication between the main frame and the terminal. The data fields in the ICAO accident record are in the same order as in the NTSB system record but, unlike NTSB's fields, the ICAO fields are indexed so they are position independent.

All coded data are contained in a 1,600 character record, similar to that of the NTSB system. An additional 9,000 characters are available, in 1,000 character increments, to contain the complete narrative.

A "Four Phase" intelligent terminal is used. It has 72,000 characters of memory and two disc drives with a total of 6,000,000 characters storage, a CRT for terminal to operator communications, and a 300 line-per-minute printer.

Most of the main frame logic is written in COBOL. Some of the intelligent terminal's logic is in assembly language although it can be written in COBOL.

Both the main frame and the intelligent terminal software were designed to be maintained easily. The inquiry logic is not "hard coded" and related to the fields being searched as is true of the NTSB system logic. Rather the logic is "table driven". Thus, the logic performs the search function independently of any field or its contents. For example, every make of aircraft is an entry in a table. Each such entry contains, among other things, a pointer to the table where each entry is a model produced by that manufacturer. It is easy to modify most of these tables from a terminal to incorporate, e.g., a new model or a new engine option. This can be accomplished in a few minutes by an aviation safety analyst who has little or no knowledge of programming.

The COBOL logic in the main frame computer can be changed almost as easily from the terminal by a programmer because the operating system (central logic monitor and controller), like those of most modern main frame computers, employs a conversational operating mode to facilitate the incorporation of logic changes.

e. ICAO System Details. Additional details of the ICAO system are contained in Reference 9.

3. CANADIAN AIR TRANSPORTATION ADMINISTRATION.

a. System Origin and Goals. The Canadian Air Transportation Administration (CATA) system was designed at the same time as the ICAO system, in the early to mid 1970's. Both systems are still undergoing development. Much of the design and testing was done on the Ministry of Transportation (MOT) IBM 360 computer. Both were designed as online, immediate response systems with extreme software flexibility. Section III. E 2. described the

ICAO system and this section will discuss the differences between the CATA and ICAO systems. The CATA system has a few more features.

b. Analogies With ICAO. The principal differences between the CATA and ICAO systems are:

(1) The CATA records all accidents and available incidents involving any size aircraft.

(2) The CATA records many more data elements, particularly for crash kinetics, medical and human factors. The accident report forms presently provide for 775 fields or data elements and the computer record will accommodate about 400.

(3) No coding is required to enter data into the CATA system. The field investigation form is computer compatible. Many items are multiple choice and each item carries the computer "field number" so the terminal can "prompt" the operator for the next field.

(4) A headquarters analyst, not the field investigator, chooses the cause/factor(s), makes corrective recommendations, and edits the narrative slightly. The investigator is usually consulted on these changes and concurrence is common.

c. Manual Processing of Data.

(1) Teletype. The field investigator composes the teletype message and sends it to CATA's Safety Bureau as soon as he learns of an accident and prior to a site visit. These preliminary reports, entered weekly, establish computer records and reserve file numbers for the accidents in the accounting system.

(2) Preliminary report. Within 15 days of the accident the preliminary report is due. It is the first 3 pages of the accident report form and contains minimal descriptive information as in the ICAO system. Seventy eight of the 393 fields in the computer record are filled from the preliminary report. This information includes that required by ICAO in its preliminary report. The preliminary report is mailed to the Safety Bureau.

(3) Final report. The final report is a 14 page, largely multiple choice document. There are two appended sections, one for crash kinetics, crashworthiness etc., the other for additional medical, human factor and psychological information. This extensive investigator-selected information, excluding the narrative, is entered into the intelligent terminal upon receipt at the CATA Safety Bureau. A bureau analyst chooses the ICAO/NTSB style cause/factors, edits the narrative supplied by the investigator, and writes a synopsis; he also writes a safety proposal, if appropriate. These are entered into the computer record later after coordination with the investigator.

d. Computer Operations.

(1) Computer input. The CATA system is like the ICAO system except the choices made by the operator are confirmed in English and French only. The CATA system will accept 393 data elements, 78 of which are in the preliminary report. No coding and very little interpretation is required at the Safety Bureau. Selection of cause/factors is the critical function of the headquarters analyst. The intelligent terminal is updated daily, and the main frame computer when required.

(2) Data extraction. The CATA uses the "Extracto" software package, a collection of programs designed to remove selected units of data from large files, which is available commercially from IBM. Extracto uses the selection criteria as parameters and searches the accident files for reports which qualify. The system will find the desired reports, copy them to a work file, then indicate to the terminal operator how many qualifying reports have been found. The user can enlarge or reduce the selected report group and specify which of a variety of output and processing options he wishes.

(3) System output, routine. The CATA produces routine outputs for public dissemination, internal management use, and internal safety analysis.

(a) Public outputs. A two line mini-report with 50 characters of summarized narrative is produced weekly. Every two months, a collection of brief reports is produced. These are similar in size and content to the NTSB bimonthly briefs except they contain the entire narrative.

(b) Management and analysis outputs. A wide variety of outputs are available for internal management and safety analysis including correlations, bar graphs, etc. The IBM SPSS package is used to produce most of the statistical outputs.

(4) System outputs, special. Accidents of major significance are described in a single large document like the NTSB's full Board report on an air carrier accident. The computer system can produce other special outputs of variable tables, statistical correlations and matrices. The system at this time does not have graphics capability.

(5) Processing. All hardware is identical to that used by ICAO. The record length is 3,000 characters of multiple choice data. 500 are not yet assigned. An additional 9,000 characters in a separate file are available for narrative. All other ICAO system statements apply to the CATA system as well.

e. Further CATA System Details. Additional details of the CATA system are contained in Reference 10.

4. U.S. NAVY.

The Navy collects an enormous amount of data. Each accident record is 5,200 characters long. The reports must be coded and keypunched before computer entry. Unfortunately, many of the uses and much of the data and output of the Navy system are not applicable to civilian aviation safety considerations.

The Navy accident data system computer hardware is not state of the art but is managed so that it is quite responsive to aviation safety needs. The computer is Honeywell 2040A, the data are on tape, and the computer serves other functions as well. However, when a safety inquiry comes in, the Naval Safety Center personnel interrupt and defer the job in progress and dedicate the entire computer and 14 men to the inquiry until it is answered. The fast-response results can be phoned or mailed to the requestor.

The Navy attaches great significance to the pilot's state of health and mind at the time of the accident. Human factor data collected are well beyond what the civilian privacy act permits. The flight surgeon who spoke to the ADSS team was very enthusiastic about the use of, and the need for, still more such data.

Further description of the U.S. Navy system, including forms, procedures and sample reports are contained in Reference 11.

5. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.

a. System Origin. The NASA ASRS is a voluntary incident reporting system. It was established and is funded by the FAA to encourage the aviation community to describe safety problems in a retribution-free environment. Immunity from some violations is provided as an incentive to encourage voluntary reporting of unsafe events.

b. Manual Processing of Data. The NASA system, with its emphasis on security for the submittors, has been widely discussed in the aviation literature. Each deidentified report is scrutinized by a team of Battelle aviation analysts which includes a representative from each aviation profession, e.g., pilot, controller, etc.

This team completes several sections of the computer record for each report. The submittor fills out 14 fields. The analysis team, after studying the report and perhaps calling the author,:

(1) Completes other fields,

(2) Chooses key words (from a list) that are appropriate index words for the report,

(3) Writes a synopsis of who, what, where, when and why, and,

(4) Writes a diagnosis of the event with enabling factors, outcome and recovery.

These 4 sections, along with the deidentified narrative and the 14 fields on the report form, comprise the 6 major parts of the record.

c. Computer Operations.

(1) Computer input. The forms, coded by Battelle analysts at NASA's Ames Research Center (ARC), are transferred to tape and sent to Battelle in Columbus, Ohio to be added to the data base. The complete deidentified narrative is carried in the computer record. Quality control is manual and the system is updated weekly. There are over 60 variable-length fields. The record is 4,000-6,000 characters long depending primarily on the size of the narrative.

(2) Data extraction. Reports can be selected by values of specified fields or by key words or enabling factors. Battelle uses their own data base manager known as BASIS. It has a report generator and is conversational. The system also has IBM's SPSS but it is seldom used. A primary strength is indexing on key words or syllables.

(3) System output, routine. NASA produces a quarterly report which discusses the principal problems reported in that quarter. This is largely an edited document and contains little if any output derived directly from the computer.

(4) System output, special. NASA issues alert bulletins to the FAA on high-priority safety problems. The alert bulletin is an edited document. Special requests are processed as received from the aviation safety community.

(5) Processing. The NASA system runs on a Control Data Corporation (CDC) 6500 computer. The data base and logic are entirely disc-resident. The system can be accessed by intelligent or simple terminals. BASIS, the data base manager, is written in FORTRAN.

d. System Details. Additional details of the NASA system are contained in Reference 12.

6. AVIATION SAFETY INSTITUTE.

a. System Origin. The Aviation Safety Institute (ASI) safety effort began in the late 1960s when Mr. Tom Clevinger, an airline pilot and Ohio Air National Guard Flight Safety Officer, applied to aviation the industrial accident theories of Heinrick (Reference 13). Heinrick's work indicates that a pyramid of errors and near accidents underlie each injurious or costly accident type. Of all industrial errors, only 9 percent result in minor injury and 0.3 percent cause major injury. In analogy with Heinrick, Clevinger and John Galipault, President of ASI, concluded that an aviation accident can be associated with approximately 30 incidents, as defined by the FAA, and can be associated further with another 300 or so near-incidents or errors, many of which are unreported. An Air Force safety analysis of two bomber wings, conducted in the late 1960s, confirmed this pyramid principle.

Timely identification and prevention of these incidents and errors could preclude the analogous accidents. This principle was applied in a test case with Clevinger's Air Guard unit. The errors were identified and ranked for relative danger and frequency, and presented to the pilots as a check list to be completed anonymously.

The identification, ranking, etc. were conducted according to the best academic statistics and measurements methodologies then known. The details have been published (Reference 14). The error performance of the Guard pilots was observed to decrease as a result of this effort.

In applying this technique to civil aviation safety, anonymous incident reports received from the aviation community are scanned by professionals in the same occupation as the submittor, e.g., pilots, controllers, maintenance specialists, etc. The errors listed in the report are ranked for severity in terms of danger potential and frequency of occurrence. (The professionals had in most cases already thought of and ranked the errors, but new errors can be added an any time.) Each error is considered to have a human, machine, and environment component. Each error thus carries a severity and frequency ranking for each of the 3 components. All the errors are fit conceptually into a three-dimenisional matrix according to their human, machine and environmental component significance derived from the severity and frequency of the error.

Newly reported occurences of known errors can be compared with the matrix. If an increased frequency or severity is evident in reports from the field it may be cause for alarm. Likewise, cells of the matrix that ought to have equal report populations i.e., that have equal severity and risk ratings in two of the three error components but diverge significantly in the third, are candidates for closer investigation.

b. Manual Processing of Data. Incoming error reports from controllers, pilots, etc., are mailed, or telephoned, to the ASI office in Worthington, Ohio. An analyst of the same profession as the submittor selects the reported errors and completes any other fixed fields which the computer record provides for. There is only one report although ASI may telephone the author, if known, for additional data. The computer record has over 40 fields including the narrative which is carried in full. The report is not coded beyond the completion of a multiple choice form.

c. Computer Operations.

(1) Input data. Computer input data are entered directly via a terminal in the ASI office. The data base is usually updated daily.

(2) Data extraction. The data base can be searched for specified values of specified fields or for narrative key words. The selected reports can be output completely or in parts. Reports can be organized in different output forms if desired.

(3) System output, routine. ASI produces a newsletter every two weeks. It is prepared manually and highlights the most critical errors reported in the last few weeks. ASI also produces a larger summary report as needed. The computer is used for inquiries rather than the generation of output for public dissemination.

(4) System output, special. A significant output of ASI consists of personal letters and phone calls. It is ASI policy to call or write contributors of error reports, if their identity is known, to inform them of what action is being taken by ASI as a result of their reports. Likewise, when an immediate safety hazard becomes apparent, ASI contacts the responsible party. This may be the FAA, an aircraft owner, operator, airline, or manufacturer.

(5) Processing. The Compuserve Company of Columbus, Ohio donates computer time worth $75,000 each year to ASI. The system is a collection of Digital Equipment Corporation (DEC) PDP-10s and System 20s. The data base and logic are stored on disc. Compuserve offers 18 and 23 hour service and ASI is online to their data base on request.

A Compuserve proprietary data base manager named Infoplex is used to access ASI data. It is conversational, contains a report generator, has graphics capability, forms display, and incorporates the IBM statistical package, SPSS.

(6) Activity. ASI has received 30,000 reports in the last 5 years. Direct action by ASI has resulted in correction of some 600 problems by all segments of the aviation community.

d. Detailed System Description. Additional description of the ASI system is contained in Reference 15.

7. FAA ROCKY MOUNTAIN AND SOUTHERN REGIONAL SYSTEMS. The Rocky Mountain (ARM) and Southern Region (ASO) Flight Standards Offices constructed their own region-specific accident information systems. Both regions felt that they needed instant search and retrieval to provide fast response to management inquiries. The national FAA system provides from two to six week response to special inquiries. Both regional systems are online and responses are usually available in 15 minutes. The two systems are quite similar. The Rocky Mountain system is described here.

Data are taken from the accident report package as it passes through the Regional Office enroute to the MAC in Oklahoma City. Only accidents which: occurred in the region, involved a pilot who resided in or was certificated in the region, or involved an aircraft certificated in the region are included in the regional data base. The regional safety staff computerizes only 31 items from each accident. Most of the fields are direct entry data such as time or aircraft registration number. Others use obvious abbreviations. Minimal coding is required.

The data base can be searched any time during the work day. The search request is entered from a terminal in the regional office. Responses to inquiries are immediate. The system can search for any one parameter value, select the qualifying reports, and print the values of fields which the analyst specifies for each report selected. The fields can be printed in the order the analyst chooses, but the column header is fixed for the variable displayed. A specified field from the selected reports can be compared with another variable and displayed as a row and column matrix by using a statistical package to process the data. Certain data can be printed as a graph. The only routine output of the ARM system, the monthly accident rate for each GADO, is output graphically. This is the only accident system surveyed which attempts to measure exposure based on total aviation fuel used each month in each Regional GADO area.

The software is a commercial system named RUS which the FAA's Airways Facilities Service (AAF) uses to produce equipment status reports. The ARM safety staff modified a subset of the RUS logic slightly to perform their functions. RUS is written in FORTRAN and COBOL and maintained by a private contractor. The graphics logic was written in FORTRAN by the ARM staff and is not part of RUS. The statistical processor is a commercial logic package.

The computer is a CDC Cyber 6000. Storage is on disc for on line access. Any terminal can be used, or the output can be diverted to a high speed printer.

The FAA ASO accident system differs in that the data stored for each accident is somewhat different from that computerized by the ARM, and some of the abbreviations and codeable field values are different. Both the ARM and ASO systems will be replaced with GAADS, the intended replacement for the existing FAA system. GAADS will offer the same instant access which the regions required, along with a nationwide data base and more extensive accident records.

Further details of the ARM and ASO Systems are given in References 16 and 17.

8. COMPARISON OF SYSTEM FEATURES. A comparison of the major features of the systems surveyed by the ADSS team is shown in Table 1 on page 8.

A matrix comparing the individual data elements used in each system surveyed by the ADSS team is contained in Appendix A.

F. ADSS USER SURVEY.

1. FLIGHT STANDARDS FIELD OFFICES. The ADSS study team conducted a survey of the primary FAA users of accident information, the Flight Standards Field Offices. A questionnaire, shown in Appendix B, was sent to the Regional Flight Standards Offices, FSDO's, GADO's and Air Carrier District Offices (ACDO).

Replies were received from 11 of 12 Regional Offices (RO), 65 of 84 GADO/FSDO's and 9 of 21 ACDO's. Results of this survey confirmed suspicions of the low degree of usage of the present system, and provided many suggestions for improvement in procedures, data collection, accessibility, output, and presentation. These suggestions provided the basis for many of the requirements discussed later in this report.

a. Personnel.

(1) GADO and FSDO. Most respondents in GADO/FSDO's are Accident Prevention Specialists (APS) with considerable flight time and field experience in accident investigation (AI) and flight operations. They reported little formal training in accident investigation and virtually none in data interpretation and analysis.

(a) Present positions. Twenty respondents did not list their positions; 39 are presently APS's. The remaining 9 are Inspectors or Chiefs.

(b) Flying. Most are pilots, 43 have Airline Transport Pilot (ATP) certificates. 18 are flight instructors. Their average flight time was 10,516 hours.

(c) Accident investigation training. Twenty respondents averaged 10 years of AI experience. Only 12 of the 20 reported AI school and some of those 12 had little or no actual experience. Only two had formal training in automated data processing, interpretation, or analysis.

(2) *Regional flight standards offices.* All 11 Regional respondents are Accident Prevention Coordinators (APC). Their backgrounds are similar to their counterparts in the field. All are pilots averaging about 10,000 hours. 9 have ATP certificates, 7 have been accident investigators (AI's) but only 2 mentioned AI schooling. 2 listed experience in automated data processing (ADP) but none had any specific training in data analysis, mathematics or statistics.

b. Accident Data Usage.

(1) Areas of interest. All respondents are interested in flight operations, regulations and medical human factors in that order. More Regional APC's than GADO respondents were also interested in maintenance and engineering.

(2) Use. Most read accident information as part of their job, although several GADO APS's complained that they couldn't get the data or didn't know what was available. It appears that some don't use the accident data constructively to guide them in any action or decision making. Several field respondents who said they used the data were obviously unfamiliar with the outputs.

(3) <u>Frequency</u>. Regional APC's refer to accident data more often (seven read it daily) than do their GADO/FSDO counterparts. Half of the field people who use the information at all do so only weekly or monthly.

(4) <u>Satisfaction</u>. Seventy five percent of the field people who "would use if" don't know or can't get what is available. The unsatisfied APC's often say the available data is not what they need. Specific complaints are "computer access nearly impossible" and, most often, "DATA IS NOT RELATED TO MY GEOGRAPHIC AREA OF INTEREST".

(5) <u>System</u>. Sixty percent of the field respondents who commented claimed to use the FAA outputs as their first choice, although over 50 percent of those who graded the individual publications had "never seen" most of the FAA publications. Most of the remaining 40 percent prefer NTSB publications. A few had seen ICAO products. Most Regional APC's use FAA and NTSB outputs in that order. Most receive both. None were familiar with ICAO publications.

The APC's "special request" non-routine data monthly from both FAA and NTSB. The field APS's make special requests less often or never.

(6) <u>Problems</u>. Perhaps because they request special searches more often, 70 percent of the Regional APC's are not satisfied with their present system. About 50 percent of the respondents don't like the search abilities or output format, want more narrative (none want less), and more data elements. The GADO people generally are less critical of what is available. Sixty percent are satisfied with their present system, 80 percent are satisfied with the existing format, and 40 percent believe their system has too little narrative, but 10 percent believe too much. Fifty percent want more data elements.

c. <u>Searching, Outputing and General Improvements</u>.

(1) <u>Formats and presentations</u>. The three Regional APC's who commented in this section wanted printouts with less code. "Near-English" abbreviations would be acceptable. GADO respondents agreed and added that the system should:

(a) Provide brief, uncoded summaries routinely and quickly on accidents elsewhere that involved pilots resident in their GADO.

(b) Provide more breakdown on cause and type accident—e.g.: was the problem approach under instrument or visual meteorological conditions (IMC or VMC); was the fuel problem due to starvation or exhaustion?

(c) List accidents by location and make/model; show the number of accidents vs. pilot skill level; show what errors were made and by whom.

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(d) Categorize and summarize. Use total number of accidents that classify under certain cause factors, phase of flight, pilot experience, etc. headings rather than listing individual reports.

(e) Provide a breakdown by region and GADO showing accident type, pilot experience, etc.

(2) Search improvements. There were no search/selection ideas submitted.

(3) General improvements. Few GADO respondents suggested improvements; most Regional APC's replied that the system should:

(a) have readable outputs,

(b) provide for immediate Region and GADO access to data,

(c) provide for the investigating GADO to notify the pilot's home GADO immediately of the accident. The home GADO might help in the investigation and could answer local news inquiries better,

(d) add information so the system can calculate accident rates as a function of exposure,

(e) be consolidated into one system with those of NTSB and ICAO.

d. Specific Improvements.

(1) Computerized narrative. The APC's are more willing than field investigators to trust the abbreviation of narrative to headquarters analysts. Thirty percent of the APC's could accept narratives summarized by an analyst, but only half as many (17 percent) of the field respondents prefer this. Fifty percent of the APC's preferred a narrative summarized by the investigator. This is acceptable to 43 percent of the field. However, 38 percent of the field respondents prefer computerized narrative verbatim as written by the investigator.

(2) System response to special request. Twenty percent of the APC's and 12 percent of the field people want responses in one or two hours. Another 33 percent of the field and 20 percent of the APC's can wait as long as a week. Most of those demanding a rapid response are accustomed to it because they have this feature in their local system.

(3) Alerting algorithms and graphs. Eighty percent of the field respondents and most of the APC's would prefer automatic alerting software algorithms to detect problem trends. Fewer respondents commented on graphical presentations but most liked the idea.

(4) Data type and amount. Field respondents suggested a number of items to be added to the present accident report and others that should be computerized from the accident report. Most of their comments appear to be efforts to help determine the degree of "pilot error" by adding to the accident report:

(a) the pilot experience level and certificate,

(b) the pilot ratings,

(c) simplified flying time,

(d) the number of off duty hours in the last 24 for agricultural accidents,

(e) a list of incidents involving the pilot,

(f) the name of the flight instructor of a low-time student involved in the accident,

(g) the date and location of the last biennial examination, also the examiner's name,

(h) the frequency of refresher training,

(g) the attendance at accident prevention meetings.

And by adding to the computerized data base the following additional items of accident information:

(a) the state of occurence and of pilot residence, also the Region and GADO of Pilot residence,

(b) the pilot's experience,

(c) the aircraft type,

(d) the aircraft hours,

(e) the weather conditions, including temperature, winds aloft, stability of air mass, and forecast vs. actual weather, if significant,

(f) light conditions,

(g) the brand names of chemicals in agriculture accidents,

(h) the accident type by season and part of country,

(i) the pilot time in last 90 days,

(j) when the pilot trained,

(k) a brief accident summary,

(l) all incidents,

(m) all items in the accident report.

e. Other User Survey Suggestions. Respondents listed a broad spectrum of actions that might be taken to correct safety problems. For example, the capability should exist to alert regions, Headquarters, GADO's, affected operators and pilots of an impending safety problem, individually, via letters and safety meetings. A good alerting system could result in the issuance of more timely Airworthiness and Maintenance Directives, and the filing of Malfunction and Defect reports. Sound statistical data could lead to proposed changes to the Federal Air Regulations.

(1) More data/better analysis. Eighty percent of the APC's and field personnel felt that more complete accident data and better presentations and analyses could help to identify safety problems and to initiate corrective action.

(2) Identification of safety problems. According to a number of respondents, safety problems could be better identified if the information system could:

(a) consider the individual recommendations of investigators,

(b) *analyze incident as well as accident data,*

(c) include algorithms to spot safety trends,

(d) provide analysts, especially in GADO's, with easier access to data,

(e) place more emphasis on present safety programs,

(f) operate with increased manpower, because the present manpower allocation does not permit adequate follow-up actions,

(g) provide computer terminals so that the analyst (APC) can ask questions of the system as needed,

(h) place more emphasis on psychology and physiology of pilots.

(3) Initiation of corrective actions. Field respondents emphasized the need to get more information to the user, provide for more personal contact with pilots and operators through the hiring of more people, and provide some positive response by the system or its managers to inspector's accident prevention suggestions.

Two other particulary thought-provoking suggestions from APC's for system improvement are:

(a) Provide users with a complete inventory of what is available, who creates it, how is it updated, cross-reference capabilities with other systems, sample of output and input forms, sample access keys, and the equipment required to access the data bank.

(b) Set up a direct system of reporting all safety-related occurrences, e.g., combine incident report with SDR, etc.

f. User Survey-Tabulated Results. A complete tabulation of the data gathered through the survey questionnaire (Appendix B) is contained in Appendix C.

2. FAA OFFICES OUTSIDE THE FLIGHT STANDARDS SERVICE. In addition to surveying all Flight Standards' Field Offices, the ADSS team surveyed all other FAA offices that might have use for general aviation accident data. Responses came from the Air Traffic Service, Office of the General Counsel, and several offices within the Engineering and Development (AED) complex.

a. Air Traffic Service. Air Traffic Service (ATS) uses the GA accident data provided by the NTSB. Their requirements for additional data include: the type of airspace, whether controlled or uncontrolled; Air Traffic Control (ATC) services provided, advisories, flight plan type; the type of ATC-controlled facility; pilot qualifications; whether transponder/encoder equipped; and reported weather and time of day, i.e., dusk, dawn, night etc.

b. Office of General Counsel. The Office of the General Counsel (AGC) reports that their attorneys use FAA/NTSB accident reports in preparing claims for litigation. An improved system would be helpful in analyzing the frequency of particular types of accidents, the involvement of certain types of pilots and accident breakdowns by type of aircraft. In a subsequent interview they commented that additional data elements of legal interest would be desirable. These include: whether or not an event resulted in litigation, the dollar amount of both the claims against the U.S. and the amount awarded by the court for each claim, the law firms and plantiffs, involved case numbers, and a synopsis of the decision of the court.

A special study, "Aircraft Design-Induced Pilot Error", (Reference 18) meeting some of the requirements of AGC, was performed by NTSB (then CAB) in February, 1967, and is described in section III. G. 9. of this report.

c. Systems Research and Development Service. In the Systems Research and Development Service (SRDS), the Airport Surface Traffic Control (ASTC) Program reports the use of the NTSB accident brief data base and offers suggestions for improving it.

The ASTC Program Office suggests that: (1) there be an indication of whether the airport has a tower and whether or not the aircraft were controlled; (2) a "police accident report" type drawing would be helpful in reconstructing the accident; (3) the type of natural light conditions, including flightpath of aircraft with respect to the sun, if important, be given; and (4) retrieval by each causal factor be possible.

The Aircraft Separation Assurance Branch attempts to reconstruct mid-air accidents and incidents and their environments to determine if Automatic Traffic Advisory and Resolution Service (ATARS), Beacon-based Collision Avoidance System (BCAS) and other separation assurance programs might have prevented the mid-air. A future enhancement of ATARS is the inclusion of terrain and obstacle avoidance advisories, but data concerning terrain/obstacle accidents, while readily usable for air carrier and military aircraft, are not usable for general aviation. A data base with frequency and location of general aviation accidents would aid in evaluating the potential benefits of an ATARS terrain/obstacle clearance algorithm.

The ATARS program requires the following: (1) data on all mid-air accidents/incidents, GA, air carrier and military; (2) the number of mid-air accidents and fatalities related to the total number of accidents in order to evaluate the magnitude of the problem; (3) a description of the accident/incident environment, including traffic density; (4) information adequate to reconstruct the accident; (5) controller actions and instructions during the time relevant to the accident/incident, the phase of flight and any conflict alert indications; (6) descriptions and equipage of aircraft avionics including transponder/encoder and whether operating or not; (7) pilot workload environment; (8) frequency, location and descriptions of accidents in which terrain/obstacle was a factor; and, especially; (9) inclusion of current data.

The SRDS Airports Division reports use of accident data to determine potential deficiencies and to identify areas needing better lights, signs and marking. They comment that the reported accident causes are often vague or too numerous to be meaningful. Also, the accident form does not provide for either a description of the Crash, Fire and Rescue (CFR) Service capability or an accounting of the CFR services actually rendered, although the CFR unit keeps such records.

The Aircraft and Noise Abatement Division of SRDS uses NTSB and FAA data intensively in focusing engineering and development efforts on specific areas of concern such as human factors, stall/spin accidents, instrument skill degradation, etc. This office also suggests that with (1) better analysis, (2) improved breakdown by causal factors and subfactors into numbers and percents, and (3) inclusion of statements of pilots involved, then corrective actions, such as better pilot training or improved aircraft design, can be conceived and evaluated.

The SRDS Helicopter Operations Development Program Office reports that their program would benefit from a review of helicopter accidents, followed by continued updating of data. The review should help identify areas where application of R&D efforts would reduce helicopter accidents. They do not currently receive accident/incident information for this purpose.

## G. OTHER FACTORS RELATED TO THIS STUDY.

The need for improving the present accident information system is emphasized by the experiences of various organizations who have tried to use this type of information to conduct safety studies. Current aircraft accident and incident data systems vary in information content, format, quantity, availability, and recording/encoding designations. The diversity in computer systems hardware and software results in system incompatibilities not conducive to effective, complete and expeditious retrieval of aircraft accident/incident information. The most common data sources are those of the NTSB and the FAA. Although both agencies gather data for general aviation and air carrier accidents, the NTSB is the sole official source for accident data. The user survey described in section III. F. confirmed that little or nothing is done to enhance user awareness of the types and quantities of data that exist to meet his unique requirements. It is also confirmed that the data compiled, stored and published in regular and special reports are not providing maximum benefits to the user.

There are differences in coding between the FAA and NTSB systems. For example, the NTSB codes stall, spin, spiral and mush type accidents separately (Reference 7). Accidents in which the causal factor is classified by the FAA as a stall include mush type accidents in the stall category, and spiral accidents within the spin category. This difference in coding is compounded when an evaluation of the accident information indicates that a stall or spin causal factor could have been present in an accident which was not classified by NTSB as either a stall or a spin accident. For example, an accident which was defined as a hard landing by the NTSB might be classified by the FAA as a stall which resulted in hard landing (Reference 5).

Similar ambiguity and lack of specificity is evident in the FAA violations system. Air carrier and general aviation violations are coded (Reference 19) as:

-05 landed on wrong airport or runway
-30 noncompliance with ATC
-35 operations on or near airport
-53 radio communications or malfunction

But the coding alone is not specific enough to describe exactly what happened or what the pilot did. A typical narrative, "violation of FAR 91.87," provides no clarification of the accident. FAR 91.87 governs all aircraft operations at an airport with an operating control tower. Such a statement not only fails to describe what happened, but also fails to state just which section or part of the regulation was violated.

The individual who is coding the data is both guided and limited by the manual relating to that particular data base. Thus, the individual code chosen reflects the raw accident/incident/violation data as interpreted by the person doing the coding.

Several examples in this section illustrate some of the difficulties, shortcomings and inconsistencies encountered by users in their efforts to obtain meaningful, current and accurate aircraft accident/incident data for review and analysis. These efforts were reviewed to help establish requirements in terms of the need for information system improvements.

1. FAA AVIATION MEDICINE INTEREST. The Office of Aviation Medicine (AAM) indicated that a need exists to improve the Medical Accident Data System (MADS). This system contains coded data from accidents of medical interest and is used for both research and administrative purposes. However, many medical facts of interest are presently not collected in the field and therefore are not available in the system. At the present time, there are very definite limits on the manpower available to collect these data, and the expectation is that this situation will not improve. Therefore, Aviation Medicine requirements, as expressed, are not of the scope and magnitude that might be expected if these limitations did not exist. For instance, Civil Aeromedical Institute (CAMI) personnel approve of the extensive human factors/medical data collection approach of the CATA system. However, the CATA apparently can invest more of their medical resources in the investigation of accidents than is possible in the United States.

The present MADS contains many data which duplicate those in the FAA's general aviation accident system. The maintenance of such data systems requires personnel in several organizations to review reports manually, code the aircraft make/model and type of aircraft, etc., while the aviation medicine reviewer also codes medical factors. This approach should be modified so that only one person and organization codes elements of general interest (e.g., location), while special interest data elements (e.g., autopsy findings) might be the coding responsibility of the cognizant office. This concept can be extended to cover responsibility for other special interest data elements, such as those which might be collected for NTSB or AGC.

As requested by the NAFEC ADSS team, the Office of Aviation Medicine developed a preliminary set of medical data elements for consideration in the design of a new system. They emphasized that more review and investigation of detailed data needs is required and must be accomplished by a group with knowledge of human factors problems. The kinds of data elements needed, in broad functional terms, fall into these categories.

a. Estimate of survivability of impact
b. Cockpit/cabin integrity
c. Restraint systems
d. Evacuation
e. Function of exits
f. Crash/fire/rescue
g. Rescue in absence of fire
h. Psychological and behavioral background/findings
i. Mental illness
j. History of behavior and reactions to mental stress
k. Life stresses
l. Crash injuries, including autopsy findings
m. Toxicology

This information could be collected by the Aviation Medical Examiner (AME) investigating the accident, and combined with the other information already collected in MADS.

2. NTSB CRASHWORTHINESS STUDY. The NTSB has undertaken a four year General Aviation Crashworthiness Study Program. The program is designed to learn how well aircraft and their safety aids protect occupants during a survivable crash. To determine this, the Board must have data on crash forces, cabin deformation, and specific failures of seats, belts and buckles. They need to know which passengers had belts and/or harnesses fastened. Also needed are autopsy and physical examination data detailing the location, severity and cause of kinetic injuries or burns.

The accident report records in the FAA accident data system do not contain any specific crash or injury data except the total number of fatalities. The NTSB system includes the number and severity of injuries sustained by each category of occupant, e.g. pilot, stewardess or passenger. No medical details of the injury are included. Data on impact kinetics, damage severity and seat or belt failures can be included in the NTSB record at the option of the coder, but often are not. No descriptive detail is available in any case.

Since most of the information needed for the NTSB study was unavailable, the Board has begun to acquire specific data on who was injured, how and why. The present primary accident investigation form 6120.4 does not provide for the acquisition of this information in the desired format. Thus the NTSB created a new form 6120.22, "Crash Injury Report," which facilitates a detailed description of destructive forces applied to the aircraft and the resulting damage to the cabin shell and to the occupant support and restraint devices.

They also created form 6120.24 to acquire detailed description of injuries suffered. This form directs the attending physician or pathologist to "show exact location of each injury, abrasion, amputation, fracture, contusion, dislocation, hemorrhage, discoloration, or burn (with degree). Also, if possible, indicate probable direction of force which was applied to cause the most severe injuries." Location, severity, and cause of fractures is also requested to the same level of detail. Completion of these forms is required for all survivable accidents incident to flight which are investigated by the NTSB. Unfortunately, the NTSB investigates only a minority of the survivable flying accidents. No provision has been made for incorporating these data routinely into the NTSB computerized accident records.

Most of the data called for in these two new NTSB forms have also been listed as candidates for inclusion in an improved accident data system by the FAA's Office of Aviation Medicine as described in the previous section III. G. 1. The CATA accident/incident investigation forms already provide for the same data in slightly less detail.

If these data were collected and computerized routinely, the data needed for the NTSB crashworthiness study would have been available. The study could have been completed and recommendations issued in a few weeks instead of four years. Injuries or deaths may occur in GA accidents in the next four years that could have been prevented if the NTSB crashworthiness recommendations could have been issued and heeded now.

3. <u>OFFICE OF AVIATION SYSTEM PLANS ACCIDENT COST STUDY</u>. The Office of Aviation System Plans (ASP) has been evaluating the effectiveness of FAA Safety Programs by comparing aviation accident costs with agency safety program expenditures. This is done by quantifying the costs of aviation accidents in dollars, apportioning these costs among the probable causes and determining the priorities for the allocation of safety program dollars.

In determining the accident cost, their studies considered the value of human life, the cost of serious injury and aircraft hull loss and damage.

Both general aviation and air carrier accidents were considered and the relative importance of NTSB accident causes to factors was selected as 4 to 1. Data for the years 1966 to 1975 were considered. The study of air carrier accidents (Reference 20) concluded that Human Factors (Pilot Error) is the most significant cause of aircraft accidents, accounting for almost 61 percent of the total costs for the study period.

The cost assignment method reflects not only the statistical occurrence but also the magnitude of an accident in terms of societal cost or loss. This study's methodology gives quite different results from NTSB statistics. For example, NTSB concludes that weather was a cause or factor in 47 percent of the accidents between 1970 and 1974. But ASP's methodology indicates that weather was responsible for only 12 percent of the accident cost for the period.

After automation of the NTSB data base, a second paper presented a more detailed look at air carrier accidents (Reference 21). The automated data base allowed the inclusion of minor injuries and their costs in the study and provided a quick response to queries. The conclusions verified the findings of the previous study that human factors and weather are the two major causes of air carrier accidents. However, a major shortcoming in the analysis still existed because the "failed to follow approved procedures. . ." cause category was too general and did not include specifics of "why" the "pilot failed to . . . ."

A third report (Reference 22) amplified the findings of the two previous papers on air carrier accidents. For example, in weather-related air carrier accidents, NTSB cited "clear air turbulence" (CAT) as a cause in 57 accidents, while citing "thunderstorm activity" 10 times. But the 5.7 ratio of the number of CAT to thunderstorm-related accidents is misleading in that it does not express the comparative severity. When accident costs are introduced, the relative seriousness of the two causes becomes apparent. CAT events cost $7.1 million for the 57 occurrences, while ten thunderstorm events cost $21.1 million. Clearly, the report states, the gravity of the thunderstorm cause is more severe than the more-frequent CAT cause.

Reference 22 included an analysis of general aviation accident data for the same 1966-1975 period, which comprised over 49,000 GA accidents costing about $4 billion. The major difference between air carrier and GA accident costs was that the high costs of air carrier accidents occurred in the landing phase (32 percent of the accidents accounting for 52 percent of the cost),

while in GA, the highest cost shifted to the inflight phase (24 percent of the accidents accounting for 64 percent of the total costs). Also "pilot" causes were considerably more frequent in the GA category of accidents. Weather is also a serious factor in inflight and landing accidents.

The work of ASP in these studies clearly identified human error as the most serious contributor to air carrier and GA accidents. <u>But NTSB accident records did not provide sufficient insight into the human factors problems to aid in the development of accident prevention measures</u>.

In order to complete the analysis of general aviation accidents, data from four separate and distinct files had to be matched. They were the Aircraft Registration File, the FAA GA Accident Master File, the NTSB GA Accident File, and the Manufacturer/Model/Series Reference File. A number of major problems were encountered in attempting this matching. These problems are discussed in detail in Reference 23, but it should be noted that the problems could have been avoided if there existed a single or at least fewer data bases and/or the data bases would interface with one another using standardized identification and coding techniques.

4. <u>ANALYSIS OF SELECTED GENERAL AVIATION STALL/SPIN ACCIDENTS</u>. The objective of this study (Reference 24) was to evaluate, by statistical inference of a generalized chi-square analysis, the stall/spin accident history of a select general aviation aircraft fleet.

Stall/spin type accidents represent only 8 percent of all general aviation accidents, yet they are responsible for 24 percent of all fatal or serious-injury type accidents. Thus, if stall/spin accident data could be related to aircraft design, performance, aircraft usage, pilot experience, or any other identifiable parameter, this could become a tool to enhance aviation safety. This has been recognized by all segments of the aviation community and has been the subject of several reports by NTSB and FAA. A number of difficulties were encountered by the study manager in attempting to relate the applicable data bases needed for the conduct of this project. These difficulties included:

a. <u>Make/Model Coding</u>. The NTSB data base uses a five character make/model code which can cover several models of a given manufacturer or several manufacturers of the same model. The FAA accident system uses a totally different five character code.

b. <u>Causal Factor Coding</u>. The NTSB codes stall, spin, spiral, and mush type accidents separately. The FAA independently evaluates, classifies and codes the accident information. The accidents classified by FAA as "stall" include both NTSB stall and mush classifications and those classified as spin by the FAA would include the NTSB spin and spiral causes. Thus a stall or spin causal factor could be present in an accident and not be classified as such by the NTSB. For example, an accident which may have been defined as a hard landing by the NTSB may be classified by the FAA as a stall which resulted in a hard landing.

c. Registration File. The aircraft registration file reflects the annual aircraft population based on quarterly statistics. Thus, an aircraft registered in the fourth quarter of one year would not appear in that year's annual statistical summary report. In addition, when an aircraft owner does not specify aircraft usage, a voluntary portion of the registration form, a value is imputed when deriving statistics for aircraft hourly usage or exposure. Thus, neither population nor exposure is a true value, and uncertainty results from the need to estimate them.

d. Accident File Coding For Make/Model. In the make/model descriptor of the FAA aircraft registration file, the first five characters are usually the same as in the FAA accident file. The registration descriptor uses two additional characters to identify a series within a model, but these useful subclassifications are not used in the accident file.

5. NAFEC AIR CARRIER FIRE ACCIDENT STUDY. An informal analysis of NTSB accident data for U.S. Air Carrier Operations was conducted at NAFEC in March 1979 (Reference 25). The purpose was to determine if the load factor of wide-body jets involved in fire or post-crash fire accidents could be correlated with the fatality rate. The NTSB accident data reviewed was for all accidents for the years 1955 through 1977.

Accident data were taken from the NTSB annual review of air carrier accidents (Reference 26) but the effort was hindered by the lack of detailed fire or postcrash information.

Specifically, the accident data as tabulated do not differentiate between accidents involving conventional and wide-body jets. That information is available, but the air carrier accident narratives must be reviewed to obtain the type of aircraft involved.

The NTSB accident types listed in the annual report include a fire or explosion category for air carrier aircraft involved in these accidents. A further classification defines whether the fire or explosion occurred while the aircraft was on the ground or in flight. However, the fire or explosion that occurs must be the primary cause of "first type of accident" in order that the report be assigned to this category.

The 1977 tabulated data show no U.S. air carriers involved in ground or inflight fires or explosions; however, the individual narratives show four accidents in which fire or fire after impact resulted in 648 fatalities and 56 serious injuries; yet, the tabulated data are correct since fire or explosion was not the primary cause or first type of accident.

Without the narratives, an analysis limited to those accidents selected by the fire/explosion category might lead to the wrong conclusion that fires or explosions accounted for no fatalities in 1977. Thus, what first appears to be a lack of information may be a data classification or retrieval problem.

Passenger load factor is simply the ratio of passengers aboard to the number of seats available. To arrive at this figure requires knowledge of the seating capacity of the particular aircraft and the number of boarded passengers. NTSB records the total number of crew members and passengers aboard aircraft involved in an accident and the type of injury sustained. While the NTSB records the type aircraft in accident repo ts, the series is not documented. Depending upon the aircraft type, series, and carrier, various series of the Boeing 747 can seat from 300 to 395 passengers, the McDonnell Douglas DC-10 from 255 to 380, and the Lockheed L-1011 from 256 to 400 passengers.

Therefore without the aircraft type/series or seats available information, the load factor of aircraft involved in accidents can only be estimated.

Information for the accomplishment of the fire study was derived primarily from NTSB special studies and a review of narratives of air carrier accidents. The review was very time-consuming due to the inability of the NTSB system to search on other than the primary cause of accidents and the absence of any significant narrative in the computer accident record.

6. NAFEC COCKPIT STANDARDIZATION STUDY. Pilot error is a commonly cited cause in GA accidents. FAA studied the severity of this problem with a project to determine how the cockpits of common FAR 23 aircraft improved or inhibited the pilot's perception, comprehension, decision making, action and reaction (Reference 27).

The amount of protection which the cockpit affords the pilot in an accident was also considered. The majority of the support for the study's recommendations resulted from interviews with pilots and instructors. The study team also analyzed NTSB accident data but the data were of limited value due to the lack of detail in the accident reports. The team did not study incident reports. Accidents with a pilot error cause/factor were selected from the data base by the NTSB computer logic. The study team was disappointed to find that their desired information was not in the computer data base. As a result, the study team, in many cases, had to refer to the original accident files to try to ascertain the type of pilot error. Reference 27 states: "In some cases these first-hand analyses provided information relative to the lack of standardization. In other cases it was not possible to retrace the sequence of events."

During their seat belt/shoulder harness inquiry, the team found "The records of accidents compiled by the NTSB ordinarily do not specify the type of injury sustained by the occupants . . . other than . . . fatal, serious, minor or none. Thus, a comparison of injuries with shoulder harness . . . . versus . . . with no shoulder harnesses was not possible . . . ." "There is no method of determining how many of these aircraft presently are or will be equipped with torso restraints, nor . . . structural provisions for . . . attachments".

Regarding the study of seat latches: "Over 50% of the pilots interviewed offered critical comments on the . . . seat latching mechanisms. This majority related . . . incidents which they or their students had experienced." But unfortunately, few, if any, of these events find their way into accident or incident data bases. And, in too many cases, Reference 27 concludes: "Even full preservation of pilot and damaged aircraft does not insure that the specific sequence of cause and effect . . . can be reconstructed".

7. RUNWAY INCURSION STUDY. In January, 1978 NAFEC conducted an informal effort to evaluate the severity of the problem of unauthorized aircraft movements at controlled airports (Reference 28). The data sources queried were:

NTSB Accident/Incident System
FAA Accident/Incident Systems
FAA GAADS System
FAA Violations System
FAA Rocky Mountain Region Accident System
FAA Southern Region Accident System
FAA Southern Region Flight Standards Office
FAA Atlanta Tower
NASA Aviation Safety Reporting System
FAA Air Traffic System Error Reporting System

Rocky Mountain's system contained only 31 data elements and gave negative results to the inquiry.

The Southern Region's data base included accidents, incidents and violations; when queried for cases involving "failure to follow ATC clearance" the system answered with none.

NTSB's system showed 180 accidents/incidents in 12 years of data. These data showed more accidents at uncontrolled than at controlled airports. The accident/incident coding system had several shortcomings, the major one being that printouts frequently failed to explain exactly what happened.

NASA's ASR System showed only 35 cases of unauthorized taxi/take-off/landing incidents in a one year period. However, the inquiry did indicate that unauthorized crossing of runways was a much more common problem than take-off without clearance. The ASRS is misleading in that 35 cases reported in one year do not accurately represent the true gravity of the problem, according to tower ATC personnel.

NAFEC also queried the Air Traffic Service's ATC (SER) data base. Of 521 reports for the calender year 1977, 45 involved unauthorized movement of aircraft and vehicles at controlled airports. But this system also does not indicate the true magnitude of the problem because reports which result in violations are omitted from the system, and most errors go unreported as long as an accident/incident does not occur.

The closest estimate of the severity of the unauthorized taxi problem was made by the chief/assistant chief at the Atlanta tower. Atlanta airport has a chronic unauthorized runway crossing problem. 65-70 unauthorized crossings which involved other traffic were recorded in the 3 years prior to 1977. But no records were kept of unauthorized crossings which did not involve other traffic. According to Atlanta tower, the unauthorized runway crossing problem is far more severe than the unauthorized take-off problem.

This query of 10 different data bases indicated the shortcomings of the individual systems, and the inadequacy of all systems collectively, to indicate accurately the severity of a typical aviation safety problem. Most errors (perhaps 90-95 percent) are not reported to any system because the problems are resolved by phone calls between pilots and controllers.

When a pilot suspects he may be guilty of a violation, he can gain immunity from prosecution by filing a report with the NASA ASRS. Without this incentive, the erring pilot may be less likely to report his error.

This informal study was another example of a frustrating inquiry that should have been a straightforward exercise in data collection and evaluation.

8. AIRCRAFT DESIGN-INDUCED PILOT ERROR STUDY. An example of how statistical accident data can be used as an accident prevention tool was shown by the NTSB, then the Civil Aeronautics Board (CAB), in the publication of its "Aircraft Design-Induced Pilot Error" Report (Reference 18). The study, sponsored by the FAA, assessed the influence of numerous airplane design features or configurations on pilot actions leading to accidents wherein the pilot was determined to be a causal element. The study considered General Aviation Accidents involving all aircraft types (except rotor and agricultural craft) with a population of 500 or more for the year 1964. The study was undertaken because the vast majority of General Aviation accidents involve the pilot as a causal element--"pilot error." 3,732 accidents served as the basis for the study and 3,147 or 84 percent involved the pilot as a causal element.

The study provided to the CAB, in support of its responsibility for the investigation of aircraft accidents, the further opportunity to relate its wealth of accident statistics and related data to the statistical analysis and subsequent prevention of accidents.

"Pilot Error" manifests itself more clearly in some accident types than in others, in terms of discrete, singular acts, or lack of them. But it is often impossible to determine from the computerzed record exactly what the pilot error was.

A pilot error, for example, the inappropriate movement of a lever or switch, which may be described explicitly in the accident report itself, will not be carried in the computer record. The analyst would have to search the accident file manually for precise descriptions of the pilot error.

On the other hand, while a "pilot failed to . . ." cause/factor may be insufficient to resolve the precise nature of the error, these types lend themselves to analysis by Chi Square statistical tests. Thus, the variations in accident-type frequencies by make and model of airplane and type of usage can be analyzed to determine their "good" and "bad" features.

These statistically significant good and bad characteristics, determined at the ±5 and ±0.1 levels of confidence, can be of utmost importance to the GA Operations Inspector or flight instructor in insuring that their check ride pilots and/or students are aware of and can cope with the poor or marginal characteristics of certain aircraft.

These statistical analyses can also be used to evaluate the adequacy of the design, handling qualities, and performance requirements of the aircraft certification FAR's.

9. INDUSTRY ACTIVITY. The GA community is becoming increasingly more aware of the need for improvements in accident information systems. The proceedings of the Aircraft Owners and Pilots Association (AOPA), Air Safety Foundation and General Aviation Manufacturers Association (GAMA) workshop of January 30-31, 1979 reflects this awareness. Their "Aircraft Accident Data" Working Group established the following needs:

a. improved accident data collection
b. a data classification system more useful to the aviation community
c. furthering aviation safety with the ASRS
d. determination of the "why" of "pilot error"
e. improved strategies for notification of industry representatives when their products are involved in an accident
f. central collection and storage of data
g. better "rate" and active pilot and aircraft data
h. a more meaningful exposure index than accidents per mile
i. standardized terms and definitions
j. capability for trend analysis
k. increased public awareness and use of ASRS
l. merging of the FAA Safety Improvement Program with ASRS

The complete report of the Aircraft Accident Data Working Group is contained in Appendix D.

## H. PREVIOUS RELATED STUDIES.

1. EVALUATION OF THE NATIONAL AIRCRAFT ACCIDENT/INCIDENT INVESTIGATION AND REPORTING SYSTEM. During 1975, the Flight Standards Service Evaluation Staff (AFS-60) conducted an indepth evaluation of the National Aircraft Accident/Incident Investigation and Reporting System (Reference 29). The purpose of the study was to determine the adequacy and effectiveness of the program in light of "increasing workloads and changing complexities of the field inspector's job functions . . ." Results of the study which contribute to the establishment of requirements for an improved accident information system are:

a. The NTSB is reluctant to enforce the 10-day submission requirement for the Pilot/Operator Accident Report, Form 6120-1.

b. Headquarters does not provide useful feedback to district offices when general aviation incident and air carrier accident/incident reports are submitted. It was suggested that Headquarters extract trend and analysis information from submittals for reporting back to the field.

c. Manhours and expenses would be saved if the NTSB investigated all aircraft accidents and the FAA limited its investigation to determination of the involvement and discharge of the Administrator's responsibilities. When there is no FAA involvement, Form 6120-1 should be sufficient for a desk investigation.

d. Training for Flight Standards field inspectors in aircraft accident/incident investigation and reporting has not been conducted effectively.

e. Data should be collected on monies spent during the investigation.

f. NTSB Form 6120-1 does not meet the FAA's need for complete reporting of statistical information such as Emergency Locator Transmitter (ELT) equippage, biennial flight review data, and sufficient space for the pilot's and copilot's addresses.

g. Replaceable components such as control surfaces should be excluded from the definition of "substantial damage" when classifying accidents and incidents.

h. The 30-day requirement for submission of a final accident report in many cases is unrealistically short.

In addition the following points were raised:

a. ADP products of the FAA general aviation data system are not utilized because they do not indicate trends or indications of potentially unsafe conditions or safety areas which need emphasis. Feedback in these areas is needed as soon as possible.

b. Statistical ADP reports lag by at least a year.

c. Statistics are presented in unusable number format.

d. A system to correlate discharge of FAA responsibilities with the accident investigation and analysis of the effectiveness of the action taken toward correcting the safety problem are both needed.

e. A confidential report of the inspector's comments that could be withheld from the public under the Federal Aviation Act would be a useful addition to the report.

f. Definitions of incidents are too broad; specifically, "any occurrence relative to aviation safety" is only a catch-all phrase.

g. FAA Form 8020-5 is not suitable for general aviation use as it is oriented towards air carrier use. A more simple form or narrative is needed.

h. Part failures, etc., reported in the accident or incident report should not have to be separately reported by SDR's.

i. Due to confusion over definitions, many insignificant air carrier events are reported as incidents, resulting in wasted manpower.

j. Incident and SDR reports are redundant.

k. Before a Flight Service Station (FSS) makes distribution of a teletype preliminary accident/incident notice, a check should be made with the nearest Flight Standards office so that a proper classification of the occurrence can be made.

l. Manufacturer's reports of malfunctions may be more complete than the FAA's.

m. Time and money is being wasted by having both the FAA and NTSB store accident report data. The FAA should consider utilizing the NTSB information system with a few coordinated changes.

n. Improved responses to recommendations for accident prevention are needed.

o. FAA Form 8020-5 should be revised to include "abnormal flight interruption."

2. EVALUATION OF FLIGHT STANDARDS SERVICE AUTOMATED DATA PROCESSING REPORTING REQUIREMENTS. During 1977 AFS-60 conducted a survey of ADP reporting requirements (Reference 30). All routine reports including those from the general aviation accident system produced for AFS by the FAA computer center at the Aeronautical Center were considered.

All recipients were surveyed and data were collected to address the following points for each report:

- Need or justification
- Frequency of distribution
- Adequacy of format
- Correctness of distribution

With respect to the routine reports, the following conclusions were drawn:

a. There are 23 ADP reports in the General Aviation Accident and Incident Investigation and Reporting System, for which 1,831 reports were printed annually. As a result of the survey, 1,292 (71 percent) of these were recommended for elimination.

b. For most of the 537 reports recommended for retention, distribution frequencies were lengthened and distribution lists were reduced.

c. Field offices expressed primary interest in data printouts pertaining to their individual regions, rather than the entire nation.

d. Some regions use internal data sources of the daily National Summary (Teletype from AOA-5) as data sources, rather than routine ADP reports, for timeliness.

The impression drawn from this survey is that present ADP reports are little used and thus not providing the expected benefits. In survey responses, some respondents made this clear, while others did not want to give up completely this resource which might, from time-to-time, be useful. The result would be a data system with fewer users (reduced distribution lists) and less current data (reduced distribution frequencies).

3. <u>CENTER FOR SYSTEMS SAFETY ANALYSIS STAFF STUDY/IMPLEMENTATION PLAN.</u> In 1975, AFS established a working group to examine ways in which automation could be used to improve the effectiveness of the organization in achieving its aviation safety improvement mission. Impetus for this working group came from an earlier AFS study group recommendation that automation modernization was needed in the organization, and reinforced by a DOT study which addressed specific steps the FAA should take to improve safety. The resulting report of the Center for Systems Safety Analysis (CSSA) working group (Reference 31) covered the gamut of information collected in AFS and proposed ways for modernizing the data processing through automation. Specific results of the working group's effort which impact the present ADSS requirements study are:

a. The present general aviation accident data system should be improved by making it more accessible, understandable, and current.

b. The NTSB and FAA accident systems should be merged, with consideration being given to division of responsibility for update and maintenance of the data base (e.g., NTSB responsibility for cause/factor, FAA responsibility for "facts").

c. The data system should provide useful outputs to those who feed input data.

d. Automation capability is needed at the national, regional, and district office levels of the organization.

e. Field source data input to the computer system is feasible and practical.

f. Safety data bases contain interrelated information and should be tied together in the computer for maximum effectiveness.

g. Improved analytical capability in the computer and ways of deemphasizing data input are required.

h. Centralized data analysis is needed to supplement field analytical work.

i. The accident data base should be augmented with incident data.

j. Generalized data retrieval features should be incorporated into the computer programs to facilitate access and eliminate reliance on fixed report formats which may not be useful for specific questions.

4. SAFETY INFORMATION AND ANALYSIS SYSTEM AUTOMATION PLANNING STUDY. A study was undertaken in 1976 to: more fully document the safety information needs of Flight Standards; examine alternative ways of achieving a desirable level of automation modernization; review costs and benefits of these alternatives; and, propose a plan of action (Reference 32). This study formed the basis for FAA management approval of the overall program and its entry into the FAA Data Systems, Equipment, and Services (DSES) Plan (Reference 33). This was a necessary first step before substantive work could commence on individual pieces of the overall project. This Safety Information and Analysis System (SIAS) study reaffirmed the recommendations of the 1975 CSSA study. The results which are related to the ADSS study are:

a. Safety information needs require responsive online support.

b. Greater emphasis should be placed on training in the use of automated system capabilities.

c. Safety information system development should be evolutionary, with emphasis on small beneficial steps leading towards a larger but perhaps not totally defined level of automation capability. Requirements will become clearer as the use and awareness of the potential of automation increases. System requirements should be established through the use of "live" demonstration programs.

d. Less text should be collected as a means of making field results more amenable to analysis.

e. Consideration should be given to collecting incident data from airlines and manufacturers, perhaps using direct computer-to-computer interfaces.

f. The relationships between safety data bases should be exploited through automation.

g. Standardization of international reporting procedures is needed.

h. Automation benefits related to safety information are difficult to quantify, and only partly involve the accomplishment of routine technical and administrative work.

i. Centralized control over data standards and system modification is needed for all safety data systems, including the Aircraft Registry and Airman Records.

j. NMAC reports should continue to be treated separately from most other types of incidents, but should be merged and standardized with ATC SER information. (Merging these with the ASRS, which did not exist at the time of the SIAS study, also may be desirable.)

5. AIRMAN STATISTICAL INFORMATION REQUIREMENTS STUDY. During 1977, a study of the FAA requirements for airman information was conducted (Reference 34). The study reviewed the various systems in which airman data are maintained, such as the general aviation accident system, and examined user needs through numerous interviews. Results pertinent to the ADSS study are:

a. Compiling all required information about an airman (such as during investigation of an accident) involves an extensive search of various files. This is time consuming and error prone; there are but few cross-indices between systems.

b. Historical medical information relating to airmen is not easily accessible since it is maintained on a tape system requiring extensive processing.

c. Few management-oriented reports are prepared which relate to airmen. Reports typically have no historical perspective or forecast capability.

d. There is little knowledge of the availability of information in the form of either raw data or prepared reports.

e. Use of simple statistical indicators such as percentage distribution and percent change should be increased.

f. Increased use should be made of graphs and charts to help orient managers to the usefulness of the information in developing and improving standards, procedures, and programs.

g. A data and report catalog should be developed and its use publicized.

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h. Information in the existing MADS should be supplemented by airman physical and pathological characteristics to become the nucleus of an airman human factors data base.

6. IMPROVED INCIDENT RECORD SYSTEM REQUIREMENTS ANALYSIS. During 1977, a requirements analysis (Reference 35) was undertaken by the FAA Office of Management Systems (AMS) to determine how to best automate aviation incident data as reported in FAA Form 8020-5, Accident/Incident Record. Emphasis was placed on how to automate through use of the existing form, and data collected on it, rather than other issues such as types of other useful data which might be collected. Results of that analysis which apply to this ADSS study are:

a. The relationship between the SDR and the incident reporting system should be better defined.

b. Incident information requests typically are for single reports, or collections of reports, meeting specified criteria. The information is used to support violation determinations, investigations, engineering and manufacturing studies, regulatory and procedural changes, identification of airport hazards, etc.

c. A pilot program in which air carrier incident data were automated was deficient in that a remote terminal and sorting capabilities were not provided, and there was only limited accessibility to the system.

d. Consideration should be given to having three separate categories of incidents: air carrier, general aviation, and air taxi.

e. The incident system should be compatible with closely-related data systems such as SDR, violations, aircraft registry, general aviation accidents, etc.

f. Many requests for incident information require less than 1 hour responses, involve more than one key element as part of the search criteria, and require the use of "and" logic, "or" logic, or a combination of both.

g. Outputs should be logically abbreviated plain language and readable by non-technical personnel.

7. HAZARDOUS MATERIALS INFORMATION REQUIREMENTS ANALYSIS. A study was undertaken by the National Institute for Community Development in 1978 to assess the requirements for a hazardous materials incident information system (Reference 36). The study reviewed the various data collection forms, information flows, and involved organizations within DOT/FAA. One of the hazardous materials reporting forms, FAA Accident/Incident Form 8020-5 is used for events not meeting DOT requirements for reporting on DOT Form F 5800.1. Results of this study which help define requirements for an FAA accident/incident system are:

a. There is a need for a "shippers" data base.

b. Data on the amounts and flow of specific types of hazardous materials are needed for rate calculations.

c. Data should be retrievable by type of hazardous material.

d. There is a need to relate violation data to accident and incident data.

Although not specifically stated in the study, one more result stands out:

e. The FAA incident data base should be compatible with the DOT hazardous materials incident reporting system.

8. GENERAL AVIATION ACCIDENT DATA SYSTEM DEVELOPMENT PROPOSAL. One of the first safety information improvement steps taken by AFS as a result of the CSSA/SIAS work was a project to improve the existing general aviation accident system. Impetus came from at least two directions:

a. The FAA accident information system was selected to study the feasibility of transferring an existing historical data base totally into a state-of-the-art data retrieval system, and estimate the associated costs and benefits (Reference 37). The success of this early work made it desirable to continue to build on work already done.

b. The existing accident data base was to be transferred from an IBM 7040 computer to an IBM 370. The option of not effecting such a transfer but instead completely replacing the system also was considered. The intent was to use commercial time sharing computer services as an interim source of computer resources, particularly during the development and evaluation stage of such an improved national data system, rather than burden FAA or other government computers.

An initial version of such an improved GAADS was implemented for test purposes in 1977 (Reference 38). The test system contained data elements derived from the operational system, coupled with translation of codes to near-English phrases. The system used an online terminal with an advanced data retrieval capability provided by a general purpose data base management system (GIM II).

Results of an operational evaluation of the GAADS were:

a. User training on computer systems such as this should address only basics and be problem-oriented.

b. Processing features such as graphical output, interface to statistical routines, and the ability to easily produce new report formats should be part of the system.

c. Both batch and online data base update capability is needed.

d. For cost control purposes, consideration should be given to segregating the total data base into commonly used subsets (e.g., by region).

e. Types of data which should be added or tied into the accident data base are: (1) incidents, (2) violations, (3) airport of occurrence, (4) comments, (5) FAR involved, (6) certificate holder involved, (7) operator data, (8) airmen statistical data, (9) aircraft statistical data, and (10) utilization (hours flown).

Following the initial test program, the FAA management decision was to develop GAADS as a fully-operational replacement to the existing national accident information system (Reference 39). This was done using a data base management system (System 2000) on a commercial time sharing service. Some of the key features incorporated into this newer GAADS are:

a. Extraction of aircraft data from the Aircraft Registry data base by aircraft registration number.

b. Use of the NTSB data base to obtain key data elements such as city, airport, and remarks for all historical accident records.

c. Absence of routinely generated and distributed reports. Special user oriented tools provide for selection of specific accident/incident records for consideration. Results may be expressed in any of several standard report formats.

d. Input of preliminary accident notices (NTSB Form 6120.19), with expansion capability to add teletype reports. Preliminary data can be separated easily from final (NTSB Form 6120.4) data.

e. Use of an intelligent (programmable) terminal for centralized data input, using screen formats, local editing, maintenance of a local data base of preliminary records, and submission of data to the host time sharing computer.

f. The system is easy to modify, both in terms of data and functions, and the plan is to incorporate improvements in a timely fashion as they are suggested and approved.

The effort to build GAADS, including the derivation of data elements from various data sources, has highlighted the need for standardization of data coding schemes among related data bases.

## IV. REQUIREMENTS---USER ORIGINATED

This section outlines the consensus of requirements generated by the ADSS user survey and reinforced by the systems survey and reviews of previous studies.

### A. REDEFINE THE ROLE OF AVIATION SAFETY ANALYSTS.

The NAFEC ADSS survey revealed that some APS's feel their job includes analysis of problems in the GADO and design of remedial action programs. Others expect that all the problem analysis and program design should be performed at some higher level, region or headquarters.

FAA Order 8740.1 (Reference 40) specifies that the Washington Accident Prevention Staff "provides national direction and guidance regarding program activities and goals," that the regional APC's "implement and coordinate Accident Prevention Program activities," and that the GADO APS's "assist the District Office Chief in achieving program objectives." The Order also specifies that "the APS is responsible for planning, organizing, managing, and controlling the Accident Prevention Program within the geographical area of the district office." One of the usual functions of the APS is to "review accident and incident reports; analyze related statistics to identify adverse safety trends and causal factors; and initiate or recommend corrective actions to the District Office Chief." Another is to "actively seek out suggestions and ideas to improve aviation safety, implement them or forward the suggestion or idea through the regional coordinator for regional/national implementation." These paragraphs do not delineate clearly the responsibilities of the APS, APC, and headquarters analysts.

It might be more efficient for the analysis and solution functions to be performed above the GADO level. Depending upon the present distribution of training and talent, considerable duplication of effort could be avoided.

In addition, better problem analysis and improved action planning could result from a reallocation, or at least a clearer resolution, of the responsibilities.

Before recommendations for improved accident information can be formulated precisely, it must be abundantly clear who is responsible for analysis of problems and design of remedial programs.

### B. IMPROVE TRAINING OF ACCIDENT PREVENTION SPECIALISTS AND COORDINATORS.

1. DATA ANALYSIS. Very few of the APS's or APC's who replied to the ADSS user survey reported any formal training or experience in analysis, statistics or other skills that would be useful in analyzing accident or incident data and recognizing problem trends. This is inconsistent with FAA Order 8740.1 (Reference 40) which suggests that APS's or APC's "analyze data and develop

programs/actions to improve aviation safety." The APS Work Function describes the planning function: "The APS should submit an annual program plan..."... "In preparing the plan, consideration should be given to national and regional policy guidelines, district office problems and resources, industry needs and industry resources available, and the accident/incident history of the district." The managing section suggests several functions of the APS. Among these is "analyze related statistics to identify adverse safety trends and causal factors..."

Formal or on-the-job training in data analysis and/or statistics would help the APS to perform these analytical functions.

2. ACCIDENT INVESTIGATION. A few APS respondents did not mention accident investigation experience even though they had attended accident investigation school. FAA Order 8740.1 refers to APS participation in accident investigation only once, as a caution against excessive use of the APS as an accident investigator.

C. IMPROVE TRAINING OF INVESTIGATORS.

An important objective of the aircraft accident investigation is accident prevention. Investigators, through their reports, provide accident investigation data to agencies, authorities and organizations which have regulatory authority and accident prevention responsibilities. Accident prevention programs are designed according to problems perceived from reviews of accident data. Accident prevention can be effective only if the accident reports are comprehensive and accurate.

Another role of the accident report, but one that is becoming increasingly more significant, is to provide factual data that may be used in litigation. The investigator himself is frequently called upon to testify, often for the government as a defendant.

Finally the investigator may, on occasion, serve as accident data analyst in his GADO/FSDO, depending on the workload of the APS and the office staffing.

The investigator then, is primarily a supporter of accident prevention and secondarily a (perhaps reluctant) principal in the litigation process. A competent investigator can enhance aviation safety through accident prevention by acquiring and recording data; identifying violations; insuring crew competency and adherence to standards; noting possible structural problems; and performing preliminary crashworthiness, human factors and medical inquiries. An accident investigator must be well-qualified to accomplish all these functions. Extensive experience in accident investigation is a strong prerequisite, but experience alone does not guarantee a competent, thorough investigation.

Traditional investigation techniques have been limited to a search for non-human accident causes or factors, or simple human errors which resulted from an obvious violation of regulations. However, most of today's General

Aviation accidents do not result directly from a non-human factor, such as an engine failure, or even from an obvious rules violation. Safety analysts now are becoming concerned with more subtle human factors, and with cause of fatalities or serious injuries in accidents that should have been survivable. Even extensive experience as an accident investigator does not prepare the investigator to appreciate and collect more important human factor and crashworthiness data. Much more extensive training of accident investigators is required so the investigator can: (1) acquire crash kinetics, crashworthiness, and human factor and medical data, such as toxicology samples and other post mortem information when a medical specialist is not available; (2) be aware of the legal ramifications of the accident data in the report, the hazards of inconsistencies and unfounded speculation, and his possible role in litigation testimony, and; (3) be familiar with the operation of the terminal to access the computerized accident data base and the procedures for inquiries.

The majority of AI's and APS's who responded to the user questionnaire did not mention attendance at the Aircraft Accident Investigation fundamental or advanced courses given by the DOT's Transportation Safety Institute (TSI). A few had attended the fundamentals course, and hoped to attend the advanced session. Half of those who reported attending the course(s) were working as APS's and thus doing little or no accident investigation. It is well known that in the GADO/FSDO's, RO's, and ACDO's, technical personnel are utilized heavily, and their availability for training is limited. To expedite training and expose more field investigators to the training, the fundamentals and advanced courses at TSI should perhaps be consolidated. This would provide more widespread and thorough training. Some investigators who had completed both courses stated that there had been such a time lapse between the two courses that continuity had been lost.

The attrition rate of investigators in the field is high; therefore, it appears that the accident investigation training program could be redesigned and be made available to all of the present and future AI's in the field.

## D. USE LESS EFFORT TO GATHER DATA.

A common complaint voiced by the AFS field office respondents to the accident data user survey is that there is not enough time or people to investigate all accidents, as thoroughly as desired, and still perform the other required field office functions. Typical comments were: "Increase staffing, present manpower does not permit adequate follow-up.", "Hire more people.", and "Increase staffing to permit better follow-up." Similar comments were made in person to the ADSS team during visits to field and regional facilities. The same problem was mentioned during discussions with AAM personnel. No effort was made to acquire an accurate estimate of the average number of man hours at various skill levels expended in the investigation of the typical GA accident. The expenditure of more resources is an obvious, but not necessarily realistic, solution to a shortage of resources. A more efficient use of available resources, if possible, is usually more realistic, and certainly more welcome. Two approaches to more efficient use of the field investigators' time are to reduce the time needed to acquire and process the data, and to collect less data.

1. COLLECT DATA MORE EFFICIENTLY. The present investigation, data recording, and transmission processes could be expedited by better organization and more use of automation.

The investigation process itself could be enhanced by the use of a more efficient data collection form. The present NTSB Form 6120.4 requires longhand entry of much data that could be specified easier and faster by answering multiple choice questions.

Additionally, this would provide a built-in checklist to ensure that no data elements were inadvertantly omitted.

The form could be organized so that all the sections requiring information that must be acquired at the accident site are grouped and sections that can be completed in the office follow. The form could serve for both accidents and incidents, and entire pages or sections could be omitted, depending on the individual requirements, e.g., whether an agricultural accident, mid-air collision, fire, etc. Items required for completion of the NTSB Form 6120.4 could be specially marked.

Some information such as narrative, witness statements, and other textual information could be collected on a tape recorder, and not written on the form at the site, or ever.

Presently most investigators complete a rough draft of Form 6120.4 in the field, and recopy or type a clean copy after returning to the office. With a computerized accident data base that would accommodate entry of data directly from a terminal, the original field copy of the accident form, and perhaps tape recordings, could be the source for direct entry into the computer by a secretary or terminal operator. No recopy or typing would be involved. This procedure is followed by the Aviation Safety Bureau of the CATA. Approximately 15 minutes are required for a secretary to enter all accident data except the narrative, about twice as much as FAA and NTSB collect, into the computer. This entry is performed at CATA Safety Bureau headquarters. It could be accomplished at the FAA region or, if more current data are desired, at the GADO.

Preliminary data could be entered into the computer when the investigator returns to the office, or via telephone, if he had a portable terminal. This would provide a national system for daily dissemination of current preliminary accident reports. This information could be used by the computer to produce automatically Form 6120.19 for direct submittal to the NTSB, if desired. The computer record could be updated when the final report became available. The computer could generate the Form 6120.4 for the NTSB and/or create an update tape for the NTSB data base if the coding ambiguities could be resolved.

An accident data computer system could be designed to access other FAA data bases and acquire data which the investigator would otherwise have to provide. All data describing many airports where an accident might occur is stored in another FAA automated data base. Likewise, data on the aircraft type, and some information on the airmen involved could be obtained in an intercomputer conversation.

Any new report form should be designed to support computer entry via a prompting terminal.

2. COLLECT LESS DATA. Instead of, or in addition to, the labor saving measures outlined above, abbreviated reports could be completed for simple accidents. Or complex accidents could be investigated briefly and only certain statistically-selected accidents investigated in detail. These concepts were discussed with the AFS Accident Prevention Staff, but they did not favor a reduction in the percentage of detailed accident investigations. The chances of missing a new critical problem by not investigating some accidents is too great. However, if sufficient resources to handle the data-gathering workload are not available, the concept of investigating only selected accidents must be considered.

E. COLLECT MORE DATA.

A number of respondents to the User Survey, both in AFS field offices and in other elements of the FAA, expressed the need for collecting more accident data to evaluate aircraft safety programs and ATC system improvements. Needs for data not now collected were expressed by the Air Traffic Service, Office of General Counsel, several divisions in the Systems Research and Development Service, and the Office of Aviation Medicine. The Office of Aviation System Plans has found the existing systems to be inadequate for their cost analysis studies. Specific suggestions for data elements are covered in Section III. F. and H.

Additional data elements would support more detailed special safety studies to satisfy the needs of FAA Program Offices. Additional data is a requirement for automatic trend analysis with such features as a warning alert when the occurrence of structural failures in one model aircraft is significantly more frequent than in the remaining fleet of similar aircraft. This feature can uncover problems which otherwise may be overlooked. It has been used for some time now in the FAA's SDR System.

It has also been suggested that incidents be added to the data base. Statistical analysis of incidents, which far outnumber accidents, could also be a powerful tool for accident prevention programs.

Another suggestion by Flight Standards Field Offices is that the accident report include a recommendation by the accident investigator advising what could be done to avoid, or minimize the potential for similar accidents or incidents.

Additional data have been suggested in the areas of navigation and surveillance equipment, communications, airport, weather, and terrain information. Appendix A contains a detailed list of the information recorded in the major systems.

Many FAA offices and previous studies confirm the need for more extensive crashworthiness, crash-fire-rescue, medical, human factors and pilot error data. Special purpose computer-compatible addendum forms could be designed to gather more detailed engineering, medical, psychological or other technical

data in cases of special interest. An example might be a special form to acquire extensive injury descriptions, human body and airframe impact kinetics in all survivable accidents where a particular seat belt or shoulder harness was used. These extra forms could be completed and the data incorporated as directed by AFS to provide data for special studies or at the discretion of the investigating field office.

## F. COMPUTERIZE MORE DATA.

Many of the safety analysts complained during interviews and in response to the survey that the present FAA GA Accident Information System (GAIS) does not provide enough information in the computerized report. This is not surprising since only about 17 percent of the available data elements are computerized.

In some cases the data which the analysts specifically request are not acquired at all during the accident investigation. (This problem is addressed in the previous requirement.) In other cases, the data are acquired but not entered into the data base. The survey respondents usually did not distinguish between data not acquired and data not entered, and simply requested what they would like the system to offer.

Replies to the survey, suggestions by safety analysts, and a review of accident data systems suggest the following for inclusion in a more comprehensive system:

1. COMBINE FILES. GA and air carrier accidents and incidents could be combined into the same system. Almost every air carrier aircraft type known is also operated in general aviation. Currently, reference to the NTSB data base is necessary to correlate problems involving, e.g., an itinerant or corporate Boeing 727 or DC-9, with similar problems encountered in the same aircraft serving an air carrier.

Universal among all analysts, including the AFS Accident Prevention Staff, is the sentiment that only luck separates incidents from accidents and that proper and thorough investigation and analysis of incidents would do as much or more to prevent accidents as accident analysis itself. (Also discussed in section III. E.5. and 6.). A corollary question is how to acquire incident and error data, much of which must be submitted voluntarily. The NASA ASRS is only a partial solution and a data base containing most of the incidents that occur is needed for effectiveness.

2. ENTER NARRATIVES INTO THE DATA BASE. The entire narrative, verbatim as written by the accident investigator, should be computerized. Analysts who have searched accident reports stated, in response to an ADSS team inquiry, that the complete narrative must often be read to fully understand what happened. All the coded accident data collectively do not provide a sufficient description. This belief is widespread in the aviation community. One question in the user survey was: "Do you prefer a computerized accident narrative written verbatim by the investigator, merely summarized by him, or summarized by a headquaters analyst?" Thirty-eight percent of the GADO-FSDO respondents wanted every word of the investigator's description to be retrievable from the computer.

The CATA has provided for this by allocating space for up to nine thousand characters of narrative for each accident. These narratives are edited only slightly by headquarters analysts but with the concurrence of the originator.

The ICAO also provides for the entire narrative, but they have no control over who writes it. Many ICAO records do not contain the full narrative, however, because, for example, the NTSB submits all its reports, some without narrative, to ICAO on tape.

The NTSB accident record provides for only a very brief 100-character summary which is transmitted to ICAO. Members of the international aviation community (who are copying the ICAO system, at least in part, for use with their domestic GA accidents) were disappointed that NTSB does not computerize the entire narrative.

3. NARRATIVE BRIEF. A brief narrative or summary of the accident should be provided. Many uses of an accident data bank require the computer to produce a brief description of the accident. This summary is not acceptable to many users as a replacement for the full narrative, but is useful in addition to the full narrative.

Every major accident data system except the present FAA GAIS contains some narrative. The major national systems examined provide a preliminary or preinvestigation report which normally includes a descriptive summary. This summary serves as an unofficial narrative until the report is completed. (The NTSB adheres to this practice via the preliminary report form 6120.19, but does not computerize it.) After the final report is complete, the summary may be revised if warranted by the findings. Until then, some description is available for dissemination to the news media and the affected members of the aviation community. This could be accomplished quickly via widespread access to a computer data base which contains current preliminary information. The brief summary should be retained as a permanent part of the computerized accident record. It will be sufficient for many cursory inquiries, and can be carried as a field in the accident record which is usually disc-resident in more advanced systems. The full narratives are often contained in a separate file and could even be stored on tape to reduce cost.

4. KEYWORD INDEXING. Indexing keywords to facilitate a subject search should be included. The accident data systems which have extensive search capabilities usually search for a specified value of a specified field, or combinations of them. For example, an advanced system could find all accident reports involving student pilots with less than 40 hours flying time who ran off the runway during a crosswind landing in a given type aircraft, or any other information coded in specific fields. Even the most advanced accident systems cannot search for subjects in the report narratives.

Incident systems have been limited to descriptions and the computerized incident record usually has fewer fixed fields and values than an accident record. Therefore, the incident systems have developed keyword and narrative searching.

Two approaches are in use. One requires an analyst, and/or the investigator, to select from a prescribed list as many keywords as are descriptive of the incident. These are carried in the computer record in a special keyword field. An inquirer requests a computer search on the keywords of his choice. In the second approach, the computer can search the body of the narrative itself for any word, or part of a word, or phonetically-similar sound specified. (See the description of the ASI and NASA incident systems in the Systems Survey, III. E. 5. and 6.)

An advanced accident system should have assigned keywords and the ability to search the keywords and also the narrative text. The technology is already present in the incident systems.

5. INVESTIGATOR RECOMMENDATIONS. Investigator recommendations should be included in the computer record. A consistent complaint of the Flight Standards field offices is that their recommendations go unheeded and often unacknowledged.

In the words of one respondent, "If the recommendations of investigators were followed, it would increase their vigilance and their interest in and use of the system." If this problem is as acute as it is widespread, it is detrimental to the morale of the accident investigation force. People rarely perform their work diligently when they question its significance.

No one has a better understanding of the accident, and all its relevant factors, than the one who investigated it. The investigator may envision solutions to problems that might not occur to even the most competent analyst. It could be very helpful to analysts, when designing a safety program to attack a particular problem, if they could consider the suggestions of investigators of accidents where that problem was a factor. Whenever investigator suggestions were incorporated, even in part, in a safety program, the entire investigative force could be so informed and thus be encouraged to continue making suggestions and investigations diligently.

6. SELECTION OF CAUSE FACTORS. Cause factors should be selected by the investigator, aided by conversational system logic. The major civilian systems, FAA, NTSB, ICAO and CATA all include in their computerized records for each accident one or more cause factors, acts, or conditions which contributed to the accident. ICAO personnel cannot know who selected the cause factors which are coded in the report they receive from the member states. Canada, FAA, and NTSB entrust the selection of cause factors to a headquarters analyst. The reason for having an analyst rather than the investigator choose the cause factor was not determined by the ADSS team. A wide variety of cause factors can be selected in these systems. Perhaps an analyst whose primary function is reading and coding aircraft accident reports is more familiar with the variety of cause factors and thus better able than the investigator himself to choose the factor(s) that best describe the accident in question. In any case, the cause factors in the computerized report are the tentative descriptors of the accident until the NTSB determines "probable cause", which is usually one of the cause factors selected by the analyst.

Two problems with this method of selecting cause factors exist. First, the choices are not made by the individual most familiar with the accident. Second, the headquarters analyst may be sensitive to any political or economic ramifications of certain cause factors. To the extent that such considerations affect the decisions of the analyst, the objectivity and accuracy of the cause factors is suspect.

These problems could be avoided by building into the computer logic a fault tree. The computer terminal could present questions to the investigator which could be answered "yes", "no", or "I don't know." A yes or no answer would cause the computer to "ask" the next more detailed question in that sequence until a cause factor was selected to the degree of detail present in the logic. This "fault tree" analysis is well known to safety researchers (Reference 41) and could be easily adapted to computer applications as described. If the accident investigators could select cause factors in this manner with the aid of the computer, objectivity could be maximized and the investigator would not be concerned about selecting a controversial cause factor. He would not know beforehand the factor which the computer would select based on his answers.

7. INDEX. A table of contents for the accident report file could be provided as an additional field in the computer record. No accident data system can, or should, contain in each accident record all the data which were collected. This is true particularly in special study accidents such as air carrier accidents or those in which a detailed engineering analysis was performed. In addition to selecting from the data base those accident reports of particular interest, the system should provide some indication of the other nonroutine data which were compiled for accidents so that an analyst could decide whether an examination of the original file would be worthwhile.

8. ADDITIONAL DATA ELEMENTS. Many additional data elements not presently carried in the computer record should be provided. Respondents to the survey requested a variety of additional data elements including: state of occurence, state and GADO of pilot residence, light conditions at the accident site, forecast and actual weather (where significant, temperature, winds aloft, stability of air mass, etc.), accident types by season and area of country, geographical location of training of the pilot, pilot time in last 90 days, additional training since certification, attendance at Accident Prevention clinics, experience level and pilot certificate, name of flight instructor of student pilot, name of examiner of low-time pilot, a list of pilot-involved incidents, the number of hours off-duty prior to the accident, and for agricultural accidents the generic and brand name of the chemical being applied.

A variety of other specific, worthwhile data elements can be envisioned: frequency settings on navigation and communication equipment, instrument settings and readings, and availability and operational status of both airborne and ground-based systems. The need for additional medical, survival and human factor data is discussed elsewhere. An especially needed element is some measure of the use or exposure of particular aircraft, or types of aircraft, in the type operation and phase of flight when the accident occurred. An

abnormal accident frequency can be detected only if some accurate measure of the frequency of exposure of this particular aircraft/type to the specific hazard/condition exists. Present efforts to provide exposure data are discussed in Section IV. J. 5.

G. PROVIDE FOR INTERFACE WITH OTHER DATA BANKS.

The FAA maintains several different automated data bases to support its mission. These include systems to account for maintenance problems, aircraft ownership, airman ratings and qualifications, airman violations, airport and airway geography and cartography and other descriptive information. If the automated accident/incident data system logic could access relevant records from these other existing systems, several benefits could be realized. The time required to complete an accident or incident report could be reduced. Minor errors in reported data could be reduced or eliminated. Analytical studies that reach beyond the accident data would be easier to complete.

The FAA's Service Difficulty Reporting (SDR) system keeps track of problems with aircraft systems or components. These include in-flight malfunctions and failures as well as premature repair or replacement of bad parts discovered during routine inspections and overhauls. All parts and systems in all aircraft, large and small, are described by the Air Transport Association's (ATA) "SPEC 100" numbering and identification system so a part failure in aircraft used in general aviation and by air carriers will have a common identity. The present FAA GAIS provides for inclusion of the ATA SPEC 100 numbers of a failed or malfunctioning component as a cause factor. (THIS IS ONE CRITICAL FEATURE WHICH NO OTHER OPERATIONAL CIVILIAN ACCIDENT DATA SYSTEMS HAVE.) The first known failure of a component might result in an accident. If the two data systems could interface, it would ensure that a failure noted in an accident report would be entered in the SDR system. Also, the accident system logic could search automatically in the SDR data bank for maintenance problems involving the same part and a critical problem could be recognized sooner.

The Aircraft Registry System lists the owner of each aircraft registered in the U.S.A., its registration number, power plant, and other descriptive information. Most of these data are required in a computerized accident report record in comprehensive accident data systems and require extra time for the investigator to complete. Instead, the investigator could list the registration number, and one other descriptive item to provide a cross check, and the system could acquire the desired data from the Aircraft Registry file to complete the data fields.

Many aircraft accidents and incidents occur at or near airports. Most of the relevant data about an airport (number, direction, length and type surface of runways; navigation aids installed; elevation; adjacent terrain; etc.) are recorded in the national Flight Data System. If these data could be accessed, the investigator would only need to list the name of the airport and describe the position of the aircraft relative to the intended runway. The computer would complete the airport fields by accessing the airport system.

Pilot information is contained in the Comprehensive Airman Information System (CAIS). Much of these data, certification, ratings, medical history, and occupation can be retrieved by license number, protecting the pilot's privacy, and stored in the accident or incident record. Previous incidents or accidents in which the airman was involved can be referenced also. Any violations logged against the airman will be listed in the violations data bank. A particular frequency and type of violation and incident may precede a given type of accident, suggesting that a search for a similar violation and/or incident pattern might yield other airmen who are prone to a certain type of accident.

One of the concerns of the FAA is the ever-growing amount of litigation resulting from aircraft accidents. The government is becoming more frequently a defendant or codefendant. A field in an accident record should refer to any litigation relevant to that particular accident. (The requirement for training investigators discusses legal training.)

H. MAINTAIN A MORE CURRENT DATA BASE.

The aviation safety organizations surveyed have some provision to receive early notification of an aircraft accident, usually first by phone and then by teletype. The minimal information contained in a teletype or subsequent preliminary report is all the information available until the final report is completed and entered into the data base. This can take months. Thus there exists poorly disseminated information that is out of date until complete information from the final report is entered into the data base, perhaps months later.

Precisely these objections were voiced by the Flight Standards Accident Prevention Staff during an interview by the ADSS team. The publications that might be useful in detecting accident trends are not available until months later. For example, a problem that might have been detected early from one accident and one related incident makes itself known from the sheer number of mishaps long before the publications that warn of the problem are even printed.

The ADSS survey found the FAA to have an out-of-date data base with a centralized batch processing computer and centralized manpower-intensive data entry. An up-to-date system with field entry of preliminary data would make the preliminary summary of yesterday's accident available to anyone with a terminal. The investigator could submit the preliminary report as soon as he returned to his office, or even from a telephone near the accident site via a portable terminal.

The ICAO and Canadian systems use forms in which the preliminary report consists of the first three pages of the complete, final report to simplify the investigator's paperwork. Most of the data needed for the long report can be acquired in a few days. An engineering or medical analysis may take considerably longer. If the computer logic will update a report, the data can be entered as acquired either from the field or the regional office. A notation that the report is not complete should be displayed in any printout of that report until the report is completed. Certain fields such as cause/factors might better remain open until all investigations are concluded. Even so,

enough information is in the computer so an accident or incident could be useful in a trend analysis and would be available for a special-purpose search. The premise that computerized accident data cannot be released to the public until probable cause is determined is incompatible with the need for a current data base. The computer record should state that probable cause has not been determined.

Any data entry mechanism which is time-consuming, and requires typing of optical characters, card punching, or any process other than direct entry to an online system from a remote terminal keyboard makes the data base more historical than current.

## I. PROVIDE EASIER ACCESS TO USERS.

A common complaint of many AFS field personnel was that they did not receive even the outdated periodic system statistical reviews, e.g. the GAIS quarterly and monthly printouts, let alone current accident data. Some comments were: "Need computer information available at region and district level"; "When an accident occurs, the home GADO should be notified immediately by the investigating GADO"; "Have computer access available to the investigator"; "Need immediate access to current data"; and, "Provide brief summaries in uncoded printout on a routine basis of accidents involving pilots in your GADO and keep it current". These needs can be met by an online system that can respond to inquiries throughout the work day.

Field personnel indicated that their greatest interest is in, and most of their inquiries would pertain to, accidents and incidents which occured in their own GADO's or regional areas of responsibility, or which involved pilots or aircraft which had been certificated in and/or were residents of, their GADO. Regional APC's had greater interest in national accident data than GADO APS's. This interest pattern suggests the need for intelligent terminals in the region with enough memory and logic to answer local inquiries for that region and its GADO's, and a national data base which could process all national inquiries submitted either from the intelligent terminals in the regional offices or from un-programmable terminals in the GADOs.

There is a distribution problem with information not stored in the computerized accident record. Some accident files contain results of extensive engineering, medical or psychological studies and researchers who need the information must travel to the repository, usually the NTSB archives in Washington, to study these results. The entire contents of the accident file should be placed on some space-saving medium, such as microfiche, which would permit easy duplication and dissemination of the information. The saving in space and handling effected by using microfiche as the permanent storage medium, rather than the original accident file, would be a corollary benefit.

## J. PROVIDE MORE USABLE AND FLEXIBLE SYSTEM OUTPUT.

The existing FAA system can search the data base for reports that meet certain criteria and present online abbreviations of the selected reports. Many

additional capabilities are offered by other systems. The survey respondents who have at least some familiarity with ADP requested several of these capabilities.

1. CONVERSATIONAL INTERFACE. A conversational interface between the terminal operator and the computer system is critical for timely communication of information. Many accident prevention specialists desire instant access to the data base. This can be accomplished only with terminals in the field office and an online system, at least at the regional level. Also, the software must permit the APS to "talk" to the terminal while placing the request and receiving the response. The APS should not need to be a programmer to make inquiries of the system.

2. CLEAR TEXT OUTPUT. The output of the computer should be easy to read. Accident reports which are plain English, or obvious abbreviations, were requested by the analysts.

3. OPTIMUM SEARCH CAPABILITY. The most advanced accident data systems can search the reports for any specified value of any field or for additive or exclusive combinations of field values. Especially critical is the ability to search for all accidents of interest to a particular GADO or region. The advanced incident systems can search the keyword field to find incidents described by the indexing keyword, and can search the narrative looking for any specified word. These systems can even locate a misspelled word or a word which sounds like another using a phonetic alphabet.

4. MULTIPLE PROCESSING AND OUTPUT OPTIONS. The more advanced systems offer many desirable features. When a search is completed, the analyst is told how many reports were selected so he can expand or restrict the search criteria to obtain a larger or smaller group. Alternatively, the system will print all or only a portion of the selected reports. The analyst may choose to have the selected reports, or certain fields thereof, formatted into a tabular or graphical presentation. Several statistical functions are included in the software which can, for example, plot one variable against another, determine the significance of deviation of certain field values, etc.

5. AUTOMATIC ANALYSIS. If adequate exposure data were available, accident/incident system logic could calculate frequencies of accidents versus some independent variable. Thus the system could detect an aircraft, a mode of operation, a part, a pilot profile or some combination of variables which has an accident frequency higher than predicted. These functions could be performed periodically, or be initiated by, e.g., addition of new reports to the data base. Any specific events that appear in more reports than exposure rate predicts could alert the analyst to an impending problem. The only system that has such an operational warning algorithm is the SDR system at the FAA's MAC in Oklahoma City. The lack of adequate exposure data is a major obstacle to the effectiveness of an accident data system. To determine accurately whether any particular accident or type of accident occurs more often than others, an analyst must know the amount of use and hazard level applicable

to the situation and to other similar accidents in which the variable under consideration is different. Exposure data presently available are oriented toward the aircraft, rather than the pilot. The FAA's AMS has recently undertaken a new program to collect improved exposure data by statistical sampling. The sample size and selection criteria were chosen to suit the exposure data needs of the SDR system, which is designed to account for, and alert analysts to, non-human problems. A goal was to collect data on 10 percent of the most numerous make/model GA aircraft. A questionnaire was sent to a predetermined number of randomly-selected owners of a particular make/model. They had no advance notice of the program. Twenty-five thousand of the 31,000 forms sent were returned, representing 1/8 of the total registered GA fleet. The data requested were the number of hours which the aircraft was flown for different purposes, and a description of the aircraft communication and navigation equipment. No effort was made to acquire pilot related data.

Pilot human factor data is much desired by safety analysts. ADSS team members consulted with several NTSB safety analysts who have been studying the cause of GA accidents. The only exposure data which they could find pertained to aircraft, type of flying, etc. These analysts feel that any effective effort to reduce accidents further must now concentrate on human factors and human error rather than mechanical problems. This would require exposure data on pilots in addition to aircraft. The types of data suggested by safety analysts include:

a. hours flown each month by the responding pilot:

(1) in each aircraft make and model,
(2) under IMC,
(3) in unfavorable winds,
(4) in high density altitudes, and,
(5) in each geographical area.

b. pilot's total time,
c. pilot's time in type,
d. pilot's age,
e. pilot's occupation,
f. pilot's certification, and,
g. pilot's medical waivers.

K. <u>CREATE A MODULAR, EASILY MODIFIED SYSTEM.</u>

The present FAA system requires special programming to answer any new type of question. Any new or revised system should have software which provides the following functions:

1. In order to be changed or maintained easily, the software should be written in a common but efficient language, such as COBOL or PASCAL.

2. The logic should be independent of the data. This can be accomplished by extensive use of tables and pointers. With such an arrangement, search and

processing logic can be simple. If all fields in the record and permissable values or ranges are listed in tables, the object of the search can be divorced from the search logic. Thus search-processing logic needs little revision. No reprogramming is required for a unique search or study. Also, as a new aircraft, model, etc., is added to the fleet, the required tables can be amended easily by a non-programmer to include the new variable.

3. The different functions, update, revision, edit, search, statistical processing, etc. should be modular. This facilitates low-cost maintenance if a smaller program is compiled and assembled for each logic change. If the modules are stored on disc and called into main memory as needed, any process, such as input or new reports, can be accomplished using less memory, and therefore at lower cost.

Modularization permits some functions to be performed in a small computer or at an intelligent terminal. Perhaps each region could have an intelligent terminal with enough memory and logic to answer inquiries on accident data for that region only. These inquiries could come from the region itself or from the GADO's. Inquiries which require a search of the national data base could be initiated (or relayed) by the intelligent terminals to the national system, usually at a lower input/output time/cost than if the entire inquiry were conducted using an unprogrammable terminal.

## L. CREATE A DATA BASE STRUCTURE COMPATIBLE WITH THE ICAO ADREP SYSTEM.

The ICAO ADREP system is being studied and copied, in whole or in part, by several ICAO member states which are presently acquiring automated accident data systems. As a result, most of the ICAO members with significant fleets of civil aircraft will be using data bases which are common in organization, format and content with each other and with ICAO. The ICAO data base uses indexed sequential files while the FAA and NTSB data bases do not. Projections show that the majority of all GA accidents will occur in the U.S.A. and unless the NTSB adopts a file format compatible with ICAO, our data will be less useful to other ICAO member states.

## M. MERGE THE FAA AND NTSB ACCIDENT/INCIDENT DATA BASES.

The FAA and the NTSB each developed its own aviation accident system to serve different purposes as discussed in Section III. C. and E. The NTSB system contains reports on air carrier and general aviation accidents. The present FAA system contains only general aviation accidents, but the new FAA GAADS under development also will contain air carrier accident and all incident reports. Both the NTSB and FAA systems contain data extracted from the same accident report package. The NTSB computerized report contains more data than that of the FAA. About 85% of the data in the FAA computerized record is carried in the NTSB record. Thus both systems will soon be similar in content and function.

The two systems define some items differently, and resulting comparisons can be confusing. For example, in a recent article in "Flight Line Times"

(Reference 42), the National Business Aircraft Association (NBAA) quoted FAA data that showed a 63 percent decrease in business aviation accidents in 1978, compared to 1977. But NTSB data for the same period showed a 21 percent rise in business aviation accidents in 1978. This discrepancy may be the result of nothing but different definitions of business aviation. But according to a statement by the NBAA spokesman: "They're in the same building. They really ought to get together."

The uses each agency makes of its accident data system are similar. The system contents and capabilities will be largely redundant when GAADS becomes operational. Considerable savings could be realized by the elimination of one system or designing and operating a common system that would meet the needs of both agencies.

## V. ORGANIZATIONAL INTERFACES

An improved FAA accident and incident information system will affect the following offices which utilize data from the system:

- Office of Aviation Medicine (AAM)
- Office of Management Systems (AMS)
- Office of Engineering and Development (AED) (includes ARD, AEM and NAFEC)
- Office of Aviation System Plans (ASP)
- Office of General Council (AGC)

Also, all organizational levels of the Flights Standards Service will be affected as will the new Office of Aviation Standards (AVS) and any other segments of the FAA which utilize accident or incident data. The Air Traffic Service will be impacted if the Systems Error data base is integrated with the Near Midair Collision data base. The NTSB will be affected if efforts are made to merge the FAA and NTSB data bases, as will all present users of the NTSB data base.

## VI. EFFECT ON OTHER INFORMATION SYSTEMS

Modifications to the existing FAA accident data base will impact a number of information systems.

A. Systems which derive data from the system:

1. Service Difficulty Report (SDR)

2. Violation/Enforcement

3. Medical Accident Data System (MADS)

B. Systems which may be deleted:

1. Existing FAA accident system (GAIS)

2. Medical Accident Data System (MADS)

3. General Council accident information system

4. Current regional systems (ASO, ARM)

C. Systems which may be interfaced:

1. Airman Records

2. Aircraft Registry System

3. Environmental Data on FAA Aeronautical Center computer (e.g., listing of air taxi operators)

4. Commuter Air Carrier file (AFS)

5. Manufacturer and operator incident data bases

6. Service Difficulty Reporting (SDR) System

7. Edit tables (e.g., aircraft type certificate table)

8. Aviation Safety Reporting System (ASRS)

9. ATS System Error Reporting System (SER)

## VII. CONCLUSIONS

A. The ADSS User Survey indicated that the existing FAA accident data system is ineffective. It is under-utilized because:

1. Field personnel do not know what data it contains nor the function it performs.

2. It does not contain many important data elements.

3. It is inflexible in its retrieval capabilities.

4. The data base is not current.

5. It cannot provide quick response to special requests.

B. FAA personnel are not adequately trained to get maximum utilization from the system for use in accident prevention programs.

1. FAA accident prevention training programs do not emphasize data analysis.

2. Experience in data analysis is not emphasized in filling APC/APS positions.

C. The user survey confirmed the conclusions of previous FAA studies detailing the deficiencies of the existing system.

D. The information systems studied in this project provided background for improvements in the FAA system in terms of data collection procedures, data base content, and functions. Systems of organizations outside the FAA, for example, have these features:

1. Data collection forms are more nearly ready for computer input.

2. Responsive and flexible retrieval capabilities exist.

3. Additional data such as human factors and a narrative of specified length are utilized.

4. Preliminary data are used to establish the initial record of an event with timely update as additional data become available.

E. Other organizations provide more resources for the development and operation of their systems than the FAA.

F. Most systems were deficient in several areas. For example:

1. Little use is made of graphical techniques for preparing management oriented outputs.

2. Coded output is frequently used, making analysis difficult.

3. Data element coding lacks standardization, making comparison of information between systems difficult.

G. There is substantial redundancy in accident report review, data coding, and data processing between the FAA and NTSB systems.

H. The user requirements identified in this study are classified as near-team and long-range. The near term requirements can be accomplished in-house with phased improvements to the existing system. The long range requirements entail major information system changes and coodination with NTSB and possibly other organizations.

I. The FAA effort to implement near-term improvements in its system is consistent with the steps needed to satisfy the long-range requirements.

# VIII. RECOMMENDATIONS

## A. NEAR TERM.

The FAA has a requirement for continuous improvement of the General Accident Information System (GAIS) for safety improvement programs. Near-term improvements to GAADS should continue to be made. These improvements will provide for a suitable interim system if they include these features:

1. Better information flow to Headquarters, Regional and District Offices.

2. Use of text rather than coded output.

3. A clearer division of information-use responsibilities among Headquarters, Regional and District offices.

4. Improved training of analysts in data analysis techniques.

5. Direct access to the data base for the users, combined with a flexible retrieval capability.

6. Expansion of the data base to include incidents, air carrier accidents and additional data elements.

7. Provision for correlation with other data bases.

## B. LONG TERM.

There exists a limit to improvements which can be made to GAADS. The reason is that accident investigation is the responsibility of the NTSB, and FAA is guided by NTSB responsibilities and procedures.

In view of this responsibility, and the duplication of effort required to maintain two separate data bases, the study team recommends that the FAA formally approach the NTSB to explore the possibility of establishing a common data base which would satisfy the requirements of both organizations. An interdisciplinary group from NTSB and FAA could formulate a common system incorporating the following key features:

1. Compatibility with the ICAO system.

2. Increased software power over present systems, including access to any element, flexible output, and statistical analysis and graphical output capabilities.

3. An improved accident investigation form to provide for input of preliminary data and easy update capability. The form should also provide for recording of less data for events of minor severity.

4. A better ability to correlate with other data bases.

5. Procedures to collect and use additional data, particularly in the areas of: crash kinetics; human and medical factors; crash, fire and rescue; pilot error; and event location information with respect to airport runways and taxiways.

6. Event reports and a data base which will indicate "why" something happened as well as what did happen.

Two candidates for use as a common NTSB-FAA system are: a further-developed GAADS, and a U.S. version of the CATA system.

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APPENDIX A

MAJOR ACCIDENT SYSTEMS DATA ELEMENT COMPARISON

Appendix A contains a listing of all the accident data elements recorded by the major accident information systems.

These data elements are ordered according to the sections of the NTSB Form 6120.4 which is used by the FAA and NTSB for initial recording of data. Elements not actually listed on the 6120.4 are included logically where possible.

For each system, and for the Form 6120.4, there are three columns. Fld Loc indicates where the element appears on the coding form. Thus, aircraft tail No. (see page A-2) is item number 3 on page A-2 of 6120.4. It is coded on FAA card A column 65. It is item 20 of GAADS and the X indicates one can search on this field. It is on card 0, column 7 of NTSB and item 0003 on ICAO's code sheet.

A/N means the field is alpha or numeric. B is both.

C/D indicates a coded choice (from a list) or a direct entry, e.g., altimeter setting. A number in this column is the number of choices from which the coder can select.

| 6120.4 Organization | 6120.4 Contents Fld Loc | A/N | C/D | Current FAA Fld Loc | A/N | C/D | GAADS Fld Loc | A/N | C/D | NTSB Fld Loc | A/N | C/D | Canada Fld Loc | A/N | C/D | ICAO Fld Loc | A/N | C/D | NAVY Fld Loc | A/N | C/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Accident ID** | | | | | | | | | | | | | | | | | | | | | |
| Witness Statement | 1-1 | A | 2 | | | | | | | | | | | | | | | | | | |
| accident/incident? | | | | | | | 1-X | A | 2 | 1-17 | A | 4 | 101 | A | C | | | | 01-07 | N | C |
| foreign registration? | | | | | | | | | | 1-17 | A | 4 | | | | | | | | | |
| Record ID in | 1-2 | N | D | A-2 | N | D | 4a-X | B | C | 0-1 | N | D | | N | D | | | | 02-58 | N | D |
| This data system | | | | | | | | | | | | | | | | | | | | | |
| prelim report ID | | | | | | | | | | 0-72 | N | D | | | | | | | | | |
| NTSB file # | | | | | | | 126 | B | D | 0-1 | N | D | | | | | | | | | |
| aircraft tail No. | 1-3 | B | D | A-65 | B | D | 20-X | B | D | 0-7 | B | D | 102 | B | D | 0003 | B | D | | | |
| Date | 1-4 | N | D | A-1 | N | D | 7a-X | N | D | 0-17 | N | D | 108 | N | D | 0005 | B | D | 01-01 | N | D |
| day | | | | | | | 7 | N | C | | | | | | | | | | | | |
| month | | | | | | | 6-X | N | C | | | | | | | | | | | | |
| year | | | | | | | 5-X | N | D | | | | | | | | | | 01-12 | N | D |
| **Phys. Location** | | | | | | | | | | | | | | | | | | | | | |
| nearest town or? | 1-5 | A | D | | | | 12-X | A | D | 2-23 | A | D | 103 | A | D | 0010 | | | 01-41 | A | C |
| state/province | 1-6 | A | D | A-16 | A | 53 | 11-X | N | 53 | 2-18 | N | 72 | 104 | A | D | 0004 | A | C | | | |
| distance/direction | | | | | | | | | | | | | | | | | | | | | |
| from location point | 1-7 | B | D | | | | | | | 4-23 | N | D | 103 | A | D | | | | 01-48 | | |
| lattitude | | | | | | | 18X | B | D | | | | 106 | B | D | 0008 | N | D | 01-28 | N | D |
| longitude | | | | | | | 19X | B | D | | | | 107 | B | D | 0009 | N | D | 01-33 | N | D |
| est./act. position | | | | | | | | | | | | | | | | | | | 01-27 | A | D |
| accident site marked? | | | | | | | | | | | | | | | | | | | 01-26 | A | C |
| **Admin. Location** | | | | | | | | | | | | | | | | | | | | | |
| region | | | | A-13 | N | 10 | 9-X | B | 12 | | | | 105 | A | D | | | | | | |
| district office | | | | A-14 | N | C | 10-X | B | 87 | | | | | | | | | | | | |
| **Other Description** | | | | | | | | | | | | | | | | | | | | | |
| acc. site elevation (1) | 1-8 | N | D | | | | | | | 4-17 | N | D | 1205 | N | D | 1205 | N | D | | | |
| local time of acc. | 1-9 | N | D | | | | 8-X | N | D | 0-68 | N | D | 109 | N | D | 0006 | B | D | 01-10 | N | D |
| site time zone (2) | 1-10 | A | D | | | | | | | | | | | | | | | | | | |
| collision w. other AC (3) | | | | A-11 | N | 4 | 71-X | N | C | | | | | | | | | | | | |
| other AC tail No. | | | | | | | | | | 0-58 | B | D | ? (4) | | | | | | | | |
| military involved | | | | | | | | | | | | | 381 | A | 2 | 0126 | A | 3 | | | |

Notes: (1) Most other systems carry elevation under "Site Examination."
(2) Time zone shown on FAA master record not on code sheet or optical character reader output.
(3) See 6120.4 and NTSB Form 6120.4a for midair collision
(4) CATA has unique character in record ID# to indicate collision with other aircraft.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **A-AIRPORT DATA** | | | | | | | | | | | | | | | | | | | | | |
| **Airport Name** | 1-11 | A | D | | | | 13-X | A | D | 2-39 | A | D | 1300 | A | D | 1001 | A | D | | | |
| location ID | | | | | | | 15-X | B | D | | | | | | | | | | | | |
| **Acc Site Rel. to Aport** (1) | | | | | | | | | | | | | | | | | | | | | |
| on/off airport | 1-14 | A | 2 | | | | | | | 2-31 | A | 15 | 1212 | A | 14 | | | | | | |
| direction from AP | 1-15 | N | D | | | | 16 | N | D | 2-31 | A | 17 | 1213 | N | D | | | | | | |
| distance from AP | 1-16 | N | D | | | | 17 | N | D | 2-31 | A | 15 | 1212 | A | 14 | | | | | | |
| **Airport Description** | | | | | | | | | | | | | | | | | | | | | |
| airport license type | | | | | | | | | | | | | 1303 | A | D | 1002 | A | 9 | | | |
| class of airport | | | | | | | | | | 2-38 | A | 9 | 1304 | A | 2 | 1003 | A | 3 | | | |
| **Approach** | | | | | | | | | | | | | | | | | | | | | |
| approach in use | | | | | | | 109 | A | C | 2-29 | A | 25 | 313 | A | 24 | 0124 | A | 25 | | | |
| **Approach Nav Aids** | | | | | | | | | | | | | | | | | | | | | |
| pri. surv. radar | | | | | | | | | | 18-47 | A | 3 | 1102 | A | 3 | | | | | | |
| sec. surv. radar | | | | | | | | | | | | | 1103 | A | 3 | 0802 | A | 6 | | | |
| PAR | | | | | | | | | | 18-46 | A | 3 | 1101 | A | 3 | 0801 | A | 4 | | | |
| MLS | | | | | | | | | | | | | 1111 | A | 3 | | | | | | |
| ILS complete | | | | | | | | | | 18-48 | A | 3 | 1104 | A | 3 | 0803 | A | 4 | | | |
| ILS localizer only | | | | | | | | | | 18-50 | A | 3 | 1106 | A | 3 | 0805 | A | 4 | | | |
| ILS glide slope only | | | | | | | | | | 18-49 | A | 3 | 1105 | A | 3 | 0804 | A | 4 | | | |
| DME | | | | | | | | | | | | | 1110 | A | 3 | 0809 | A | 4 | | | |
| VORTAC/TACAN | | | | | | | | | | 18-52 | A | 3 | 1107 | A | 3 | 0806 | A | 4 | | | |
| VOR/TVOR | | | | | | | | | | 18-53 | A | 3 | 1108 | A | 3 | 0807 | A | 4 | | | |
| NDB | | | | | | | | | | 18-54 | A | 3 | 1109 | A | 3 | 0808 | A | 4 | | | |
| **Approach Vis. Aids** | | | | | | | | | | | | | | | | | | | | | |
| approach lights | | | | | | | | | | 18-56 | A | 3 | 1112 | A | 3 | 0810 | A | 4 | | | |
| type aprch. lights | | | | | | | | | | 18-57 | A | 11 | 1125 | A | 7 | 0811 | A | 8 | | | |
| VASI | | | | | | | | | | 18-51 | A | 3 | 1124 | A | 3 | 0812 | A | 4 | | | |
| type VASI | | | | | | | | | | | | | 1126 | 4 | 7 | | | | | | |
| landing direc. ind. | | | | | | | | | | | | | 1114 | A | 3 | 0815 | A | 4 | | | |
| wind direc. ind. | | | | | | | | | | | | | 1113 | A | 3 | 0814 | A | 4 | | | |

NOTE: (1) Also included under SITE EXAM 6120.4 Part T.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **A-AIRPORT DATA continued** | | | | | | | | | | | | | | | | | | | | | |
| **Aport Descrip. contd.** | | | | | | | | | | | | | | | | | | | | | |
| runway in use | 1-12 | N | D | | | | 14 | B | D | 11-74 | N | D | 1305 | N | D | 1008 | N | D | | | |
| instrument category | | | | | | | | | | 1127 | A | 7 | 0823 | A | 8 | 0823 | A | 8 | | | |
| **RW Physical Descrip** | | | | | | | | | | | | | | | | | | | | | |
| type-land/water etc. | | | | | | | | | | | | | 1302 | A | D | | | | | | |
| type elevation ASL | | | | | | | | | | 2-56 | N | D | 1301 | N | D | 1004 | N | D | | | |
| profile-up/down | | | | | | | | | | | | | 1325 | A | 5 | 1010 | A | 4 | | | |
| slope-degrees | | | | | | | | | | | | | 1326 | B | D | 1011 | A | 17 | | | |
| length | 1-13 | N | D | | | | | | | 2-68 | N | D | 1306 | N | D | 1007 | N | D | | | |
| width | | | | | | | | | | | | | 1307 | N | D | 1009 | N | D | | | |
| over/undershoot | | | | | | | | | | | | | 1320 | A | 16 | 1015 | A | 8 | | | |
| aprch/RW hazards | | | | | | | | | | 2-65 | A | 6 | 1321 | A | 6 | 1016 | A | 7 | | | |
| **Runway Surface Type** | 1-17 | A | D | | | | | | | 2-61 | A | 9 | 1322 | A | 9 | 1005 | A | 8 | | | |
| surface texture | | | | | | | | | | | | | 1323 | A | 5 | 1202 | A | 5 | | | |
| surface status-wet-etc. | 1-18 | A | D | | | | 115 | A | C | 2-62 | A | 12 | 1324 | A | 15 | 1006 | A | 4 | | | |
| James Brake decelerometer | | | | | | | | | | | | | 1327 | A | 3 | | | | | | |
| breaking action | | | | | | | 116 | A | C | | | | 1328 | A | 4 | 1014 | A | 6 | | | |
| JBI | | | | | | | | | | | | | 1329 | N | D | | | | | | |
| mu (μ) | | | | | | | | | | | | | 1330 | N | D | | | | | | |
| runway barriers | | | | | | | | | | 2-66 | A | 5 | | | | | | | | | |
| **Runway Aids** | | | | | | | | | | | | | | | | | | | | | |
| runway lighting | | | | | | | | | | 6[illegible] | A | | | | | | | | | | |
| edge/threshold | | | | | | | | | | | | | | | | | | | | | |
| end-lights | | | | | | | | | | | | | [illegible]5 | A | [illegible] | 0816 | A | 4 | | | |
| stop lighting | | | | | | | | | | | | | | | 4 | 0817 | A | 4 | | | |
| runway center line | | | | | | | | | | | | | | | | [illegible]3 | A | 4 | | | |
| TD zone lights | | | | | | | | | | | | | [illegible]18 | [illegible] | | [illegible]9 | A | 4 | | | |
| **Taxiway** | | | | | | | | | | | | | | | | | | | | | |
| taxiway width | | | | | | | | | | | | | [illegible] | N | D | [illegible]12 | | 4 | | | |
| taxiway edge lights | | | | | | | | | | | | | | A | 4 | 0820 | [illegible] | 4 | | | |
| taxiway center line | | | | | | | | | | | | | [illegible]20 | A | 4 | 0821 | A | 4 | | | |
| STOP bars | | | | | | | | | | | | | [illegible]1 | A | 4 | 0822 | [illegible] | 4 | | | |
| **Communications** | | | | | | | | | | | | | | | | | | | | | |
| type of last contact | | | | | | | | | | | | | 1129 | A | 8 | | | | | | |
| tower/unicom Comm. | | | | | | | | | | 2-67 | A | 5 | | | | | | | | | |
| VLF station | | | | | | | | | | 18-55 | A | 3 | 1122 | A | 4 | | | | | | |
| VHF/UHF/DF | | | | | | | | | | | | | 1123 | A | 4 | | | | | | |

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **B-AIRCRAFT DATA** | | | | | | | | | | | | | | | | | | | | | |
| **Legal Data** | | | | | | | | | | | | | | | | | | | | | |
| region certificating | | | | | | | 25-X | | | | | | | | | | | | | | |
| category of airworthiness cert. | 1-32 | A | D | | | | 28-X | | | | | | | | | | | | | | |
| type cert. sheet | | | | | | | 24-X | | | | | | | | | | | | | | |
| tail No. ① ② | 1-3 | B | D | A-65 | B | D | | | | 0-7 | B | D | 102 | B | D | | | | | | |
| serial No. | 1-21 | B | D | | | | | | | 17-66 | B | D | 120 | B | D | 0601 | B | D | | | |
| region certificating air agency | | | | B-75 | N | 10 | 124 | A | C | | | | | | | | | | | | |
| district office certificating air agency | | | | B-76 | N | | 125 | N | C | | | | | | | | | | | | |
| **Owner/Operator ID** | | | | | | | | | | | | | | | | | | | | | |
| owner name | 1-30 | A | D | | | | | | | | | | | A | D | 0602 | B | D | | | |
| air carrier (owner) | | | | | | | | | | 1-41 | A | C | | | | | | | | | |
| owner address | 1-31 | A | D | | | | 119 | N | C | | | | | B | D | | | | | | |
| operator name | 1-30 | A | D | | | | 118 | A | C | 1-65 | A | D | | A | D | | | | | | |
| **Air Carrier Operator** | | | | | | | | | | | | | | | | | | | | | |
| operator ID | | | | | | | 119a | | | | | | 113 | A | 5 | 0602 | B | D | | | |
| operator code(HQ) | | | | | | | | | | | | | 112 | | | | | | | | |
| air agency cert. No. | | | | B-66 | N | D | 123 | N | D | | | | | | | | | | | | |
| Air Trans. Comm. Lic. | | | | | | | | | | | | | 111 | A | 20 | | | | | | |
| suitable ATC lic. ? | | | | | | | | | | | | | 2611 | A | 4 | | | | | | |
| operator address | 1-31 | A | D | | | | | | | | | | | B | D | | | | | | |
| **GA Operator** | | | | | | | | | | | | | | | | | | | | | |
| type GA operator | | | | | | | | | | 1-38 | A | 17 | 114 | A | B | | | | | | |

NOTE: ① Tail # actually appears on 6120.4 as part of report ID Section.
② Aircraft serial # shown on our copy of FAA computer master tape record layout, but not on coding sheet or optical character recorder output (computer input) record layout

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **B-AIRCRAFT DATA continued** | | | | | | | | | | | | | | | | | | | | | |
| Aircraft Description | | | | | | | | | | | | | | | | | | | | | |
| Class-General | | | | | | | | | | | | | | | | 0603 | B | D | | | |
| aircraft category ① | | | | A-23 | N | C | 23-X | | | | | | | | | | | | | | |
| class/type | | | | | | | 27-X | | | 1-29 | A | 10 | 123 | A | 10 | | | | | | |
| wing code | | | | | | | 31-X | | | | | | | | | | | | | | |
| wing/rotor | | | | | | | | | | | | | 127 | A | 7 | | | | | | |
| weight category | | | | | | | 26-X | | | 1-31 | A | 2 | | | | 0604 | N | 5 | | | |
| home built/ultra light | | | | | | | | | | | | | 124 | A | 3 | | | | | | |
| type engines | | | | | | | 37-X | | | 1-33 | A | 6 | 205 | A | 7 | 0611 | A | 8 | | | |
| No. engines | | | | | | | | | | 1-32 | N | D | 203 | N | D | 0610 | N | D | | | |
| engine group | | | | | | | 34-X | | | | | | | | | | | | | | |
| landing gear type ② | | | | | | | | | | 1-30 | A | 11 | 125 | A | 9 | 0607 | A | 10 | | | |
| gear sub type | | | | | | | | | | | | | 126 | A | 5 | | | | | | |
| Aircraft-Specific | | | | | | | | | | | | | | | | | | | | | |
| make | 1-19 | A | D | | | | 21-X | | | 0-14 | A | D | 118 | A | D | 0001 | A | C | | | |
| make ① | | | | A-18 | N | C | | | | 1-20 | N | C | 800 | A | D | | | | | | |
| model | 1-20 | B | D | | | | 22-X | | | 0-52 | B | D | 119 | B | D | 0002 | N | C | 02-17 | B | D |
| model ① | | | | A-21 | N | C | | | | 1-23 | N | C | 801 | A | D | | | | | | |
| year manufactured | | | | | | | 30-X | | | | | | 122 | N | D | | | | | | |
| max to weight | | | | | | | | | | | | | 121 | N | D | | | | | | |
| gross weight | | | | | | | | | | | | | | | | | | | 13-12 | N | D |
| spec. equipment | | | | | | | | | | | | | 128 | A | 11 | | | | | | |
| Age-Service | | | | | | | | | | | | | | | | | | | | | |
| aircraft total time ③ | 1-22 | N | D | | | | 29-X | | | 17-60 | N | D | 802 | N | D | 0613 | N | D | | | |
| airframe time since overhaul | | | | | | | | | | 17-23 | N | D | 803 | N | D | 0614 | | | 07-23 | N | D |
| Aircraft time ④ since last annual | 1-24 | N | D | | | | | | | | | | | | | | | | 07-17 | N | D |
| hours since accept. | | | | | | | | | | | | | | | | | | | 07-13 | N | D |
| date last annual | 1-23 | N | D | | | | | | | | | | | | | | | | | | |

NOTE: ① FAA make/model/category are taken direct from Flight Standards aircraft and engine code book, NTSB codes from NTSB engine and code book, not sure of correlation.

② 6120.4 form calls for landing gear description under part K AIRCRAFT WRECKAGE EXAM.

③ and ④ Total time and time since inspection are shown on our copy of FAA computer master tape record layout, but not elsewhere

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| B-AIRCRAFT DATA continued | | | | | | | | | | | | | | | | | | | | | |
| Power Plant Data | | | | | | | | | | | | | | | | | | | | | |
| Engine Specific (2)(4) | | | | | | | | | | | | | | | | | | | | | |
| make (1) | 1-25 | A | D | C-39 | 1 | M | 32-X | | | 1-25 | (1)(2) A | M | 201 | A | D | 0608 | A | M | | | |
| model (1) | 1-26 | B | D | C-42 | 1 2 | M | 33-X | | | 1-27 | A | M | 202 | B | D | 0609 | N | M | 07-30 | B | D |
| rated power | | | | | | | | | | | | | 204 | N | D | | | | | | |
| recommended fuel (3) | | | | | | | | | | 1-36 | A | 14 | 808 | (3) A | B | 0612 | A | 14 | 0612 | A | 14 |
| serial # | | | | | | | | | | | | | | B | D | | | | 07-38 | | |
| type cert. sheet | | | | | | | 35-X | | | | | | | | | | | | | | |
| certificating region | | | | | | | 36-X | | | | | | | | | | | | | | |
| Age-Maintenance | | | | | | | | | | | | | | | | | | | | | |
| total time | 1-27 | N | D | | | | | | | | | | | | | | | | | | |
| time since O-haul | 1-27 | N | D | | | | | | | 17-28 | N | D | 809 | N | D | 0615 | N | D | | | |
| time since 100 hr | 1-29 | N | D | | | | | | | 1-36 | A | 14 | 808 | A (3) | B | 0612 | A | 14 | | | |
| Propeller Specific (4) | | | | | | | | | | | | | | | | 0619 | N | D | | | |
| prop. type | | | | | | | | | | | | | 208 | A | 6 | N/A | | | | | |
| reversible? | | | | | | | | | | | | | 209 | A | 2 | N/A | | | | | |
| make | | | | | | | | | | | | | 206 | A | D | | | | | | |
| model | | | | | | | | | | | | | 207 | A | D | | | | | | |
| serial No. | | | | | | | | | | | | | | B | D | | | | | | |
| time since O-haul | | | | | | | | | | 17-14 | N | D | 813 | N | D | 0619 | N | D | | | |
| rotor system | | | | | | | | | | | | | 210 | A | 9 | | | | | | |
| System Description | | | | | | | | | | | | | | | | | | | | | |
| Enroute Navigation | | | | | | | | | | | | | | | | | | | | | |
| min. IFR equip? | | | | | | | | | | 2-30 | A | 3 | 861 | A | 2 | 0623 | A | 3 | | | |
| ADF | | | | | | | | | | | | | 825 | A | 4 | | | | | | |
| VOR | | | | | | | | | | | | | 824 | A | 4 | 0647 | A | 5 | | | |
| DME | | | | | | | | | | | | | 827 | A | 4 | 0649 | A | 5 | | | |
| TACAN | | | | | | | | | | | | | 826 | A | 4 | 0646 | A | 5 | | | |
| RNAV | | | | | | | | | | | | | 847 | A | 4 | 0653 | A | 5 | | | |
| VLF-NAV | | | | | | | | | | | | | 848 | A | 4 | | | | | | |
| INS | | | | | | | | | | 21-51 | A | 4 | 851 | A | 4 | 0637 | A | 5 | | | |
| flight director | | | | | | | | | | 21-52 | A | 4 | 852 | A | 4 | 0638 | A | 5 | | | |

NOTE: (1) *Are FAA and NTSB codes for engine M/M the same?*
(2) 6120.4 requests data on engine only if engine problem.
(3) FAA lists the fuel on board under part H FLIGHT PLAN DATA. Most forms do not distinguish between fuel recommend and fuel used.
(4) Navy carries 220 character system/part ID and maintenance data.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| B-AIRCRAFT DATA Systems Description continued | | | | | | | | | | | | | | | | | | | | | |
| Approach Navigation | | | | | | | | | | | | | | | | | | | | | |
| cert. aproch. category | | | | | | | | | | | | | 817 | A | 5 | 0624 | A | 6 | | | |
| ILS complete | | | | | | | | | | | | | 828 | A | 4 | 0643 | A | 5 | | | |
| ILS localizer | | | | | | | | | | | | | 829 | A | 4 | 0645 | A | 5 | | | |
| ILS glide slope | | | | | | | | | | | | | 830 | A | 4 | 0644 | A | 5 | | | |
| MLS | | | | | | | | | | | | | 849 | A | 4 | | | | | | |
| radar altimeter | | | | | | | | | | | | | 843 | A | 4 | 0640 | A | 5 | | | |
| Control Systems | | | | | | | | | | | | | | | | | | | | | |
| dual controls (1) | 493 | A | 4 | | | | | | | | | | 837 | A | 4 | | | | | | |
| auto pilot | | | | | | | | | | 21-30 | A | 5 | 838 | A | 4 | | | | | | |
| approach coupler | | | | | | | | | | 21-31 | A | 5 | | | | | | | | | |
| electronic command control system | | | | | | | | | | 21-49 | A | 4 | | | | | | | | | |
| stability augment | | | | | | | | | | 21-46 | A | 3 | | | | | | | | | |
| auto land system | | | | | | | | | | | | | | | | | | | | | |
| Communication | | | | | | | | | | | | | | | | | | | | | |
| VHF | | | | | | | | | | | | | 821 | A | 4 | 0650 | A | 4 | | | |
| HF | | | | | | | | | | | | | 822 | A | 4 | 0651 | A | 4 | | | |
| UHF | | | | | | | | | | | | | 823 | A | 4 | 0652 | A | 4 | | | |
| transponder | | | | | | | | | | | | | 831 | A | 4 | 0654 | A | 5 | | | |
| mode C | | | | | | | | | | | | | 832 | A | 4 | | | | | | |
| DABS | | | | | | | | | | | | | | | | | | | | | |
| data link | | | | | | | | | | | | | | | | | | | | | |
| Weather Equip | | | | | | | | | | | | | | | | | | | | | |
| engine anti/de-ice | | | | | | | | | | 21-35 | A | 4 | 833 | A | 4 | 0627 | A | 5 | | | |
| prop de-ice | | | | | | | | | | 21-36 | A | 4 | 834 | A | 4 | 0628 | A | 5 | | | |
| wshield de-ice | | | | | | | | | | 21-38 | A | 4 | 835 | A | 4 | 0630 | A | 5 | | | |
| airframe de-ice | | | | | | | | | | 21-37 | A | 4 | 836 | A | 4 | 0629 | A | 5 | | | |
| weather radar | | | | | | | | | | 21-34 | A | 6 | 818 | A | 6 | 0625 | A | 7 | | | |
| turbulence detector | | | | | | | | | | | | | 853 | A | 4 | 0626 | A | 5 | | | |

NOTE: (1) 6120.4 lists dual controls under Part K, AIRPLANE WRECKAGE EXAM.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| B-AIRCRAFT DATA | | | | | | | | | | | | | | | | | | | | | |
| Systems Description continued | | | | | | | | | | | | | | | | | | | | | |
| Safety Systems | | | | | | | | | | | | | | | | | | | | | |
| anti-collision lights | | | | | | | | | | | | | 839 | | | 0636 | A | 5 | | | |
| stall warning | | | | | | | | | | 21-40 | A | 2 | 819 | A | 4 | 0633 | A | 5 | | | |
| stall prevention | | | | | | | | | | | | | 819 | A | 4 | | | | | | |
| altitude alert | | | | | | | | | | | | | 845 | A | 4 | 0642 | A | 5 | | | |
| ground proximity warning | | | | | | | | | | | | | 844 | A | 4 | 0641 | A | 5 | | | |
| heads up display | | | | | | | | | | 21-54 | A | 4 | 850 | A | 4 | 0639 | A | 5 | | | |
| collision avoidance | | | | | | | | | | | | | 846 | A | 4 | 0634 | A | 5 | | | |
| flight data recorder (1) | | | | | | | | | | | | | 1616 | A | 4 | | | | | | |
| cockpit voice recorder (1) | | | | | | | | | | | | | 1622 | A | | | | | | | |
| Other | | | | | | | | | | | | | | | | | | | | | |
| cabin pressure (2) | 4-119 | | | | | | | | | | | | | | | | | | | | |
| flight crew oxgen | 4-116 | | | | | | | | | 21-39 | A | 2 | 840 | A | 4 | 0631 | A | 3 | | | |
| passenger oxygen | 4-110 | | | | | | | | | 21-39 | A | 2 | 841 | A | 4 | 0632 | A | 3 | | | |
| environment control | | | | | | | | | | 21-50 | A | 4 | | | | | | | | | |
| maintenance detection/analysis recorder | | | | | | | | | | | | | | | | | | | | | |
| aux. power | | | | | | | | | | | | | 842 | | | 0635 | A | 5 | | | |
| Purpose | | | | | | | | | | | | | | | | | | | | | |
| purpose/type flying (3) | 1-33 | A | 13 | A-26 | A | 9 | | | | 1-39 | B | 50 | 211 | A | 4 | | | | | | |

NOTE: (1) CATA show FDR under special section equated to 6120.4 Part K. AIRCRAFT WRECKAGE EXAMINATION.
(2) 6120.4 carries oxygen data Part K, AIRCRAFT WRECKAGE EXAMINATION.
(3) Should also be listed under HISTORY OF FLIGHT. Purpose of AC may not be type flying at accident.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| C-PILOT IN COMMAND (1) | | | | | | | | | | | | | | | | | | | | | |
| **Personal Data** | | | | | | | | | | | | | | | | | | | | | |
| ID | | | | | | | | | | | | | | | | | | | | | |
| name | 1-34 | A | D | | | | | | | | | | 115 | A | D | | | | 04-12 | | |
| address | 1-35 | B | D | B-63 | A | 53 | | | | | | | 115 | B | D | | | | | | |
| social security No. | 1-40 | N | D | | | | | | | | | | | | | | | | 04-22 | | |
| nationality | 1-41 | A | D | | | | 48 | | | | | | 557 | A | 2 | | | | | | |
| occupations | 1-38 | A | D | B-36 | A | 16 | 47-X | A | C | 474 | A | 23 | | | | | | | | | |
| date of birth | 1-48 | N | D | | | | | | | | | | | | | | | | | | |
| age | | | | B-61 | | | 46-X | N | D | 4-52 | | | | | | 0502 | N | D | 04-34 | C | 31 |
| state | | | | | | | 55-X | A | C | | | | | | | | | | | | |
| **Administrative** | | | | | | | | | | | | | | | | | | | | | |
| region | | | | B-33 | N | 10 | 53-X | A | C | | | | | | | | | | | | |
| dist. office | | | | B-34 | | C | 54-X | A | C | | | | | | | | | | | | |
| certificate No. | 1-39 | N | D | C-13 | N | D | 40 | N | D | | | | 116 | N | D | | | | | | |
| status if not | | | | | | | | | | | | | | | | | | | | | |
| owner or operator | | | | | | | | | | | | | 117 | A | 6 | | | | | | |
| **Aviation Data** | | | | | | | | | | | | | | | | | | | | | |
| **Function** | | | | | | | | | | | | | | | | | | | | | |
| station occupied | 1-36 | A | D | | | | | | | | | | 508 | A | 7 | | | | 04-36 | B | 5 |
| special function | | | | | | | | | | | | | 509 | A | 7 | | | | 04-35 | B | 12 |
| pilots involved | | | | | | | | | | 4-26 | A | 6 | | | | | | | | | |
| pilot at control | | | | | | | | | | 4-78 | A | 8 | 501 | A | 8 | | | | | | |
| student | | | | | | | 41-X | A | C | | | | | | | | | | | | |
| **Qualifications** | | | | | | | | | | | | | | | | | | | | | |
| highest certificate | 1-42 | | | A-28 | B | 7 | 38-X | A | C | 4-70 | A | 10 | 510 | A | 13 | 0503 | B | 13 | | | |
| pilot ratings | 1-43 | | 12 | A-30 | N | 10 | 42-X | A | C | 4-62 | A | 24 | 519 | A | 8 | 0504 | B | 11 | | | |
| endorsements | 1-44 | A | D | | | | | | | | | | 520 | A | 3 | | | | | | |
| pilot qualifications (2) | | | | C-48 | A | 13 | 44-X | A | C | 11-71 | | | | | | 0505 | A | 4 | | | |
| instrument rating | | | | | | | | | | | | | 513 | A | 4 | 0507 | A | 7 | 04-40 | N | 3 |
| inst rating class | | | | | | | | | | | | | 514 | A | 2 | | | | | | |
| instructor rating | | | | | | | | | | | | | 517 | A | 2 | 0506 | A | 3 | | | |
| instctr rating class | | | | | | | | | | | | | 518 | A | D | | | | | | |
| type ratings | 1-44 | A | D | | | | | | | | | | | | | | | | | | |
| rated in this AC | | | | | | | | | | 4-66 | A | 2 | 511 | | | | | | | | |

NOTE: (1) On other forms PIC is subsection under PERSONNEL with detail on flight crew and injuries for others.
(2) NTSB entry not described in coding instruction book.

AD-A075 611 NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER ATL--ETC F/G 1/2
ACCIDENT DATA SYSTEMS STUDY REQUIREMENTS ANALYSIS FOR AN FAA AC--ETC(U)
AUG 79 E V COUCH , R M HILL , T KOLANKIEWICZ

UNCLASSIFIED FAA-NA-79-172 NL

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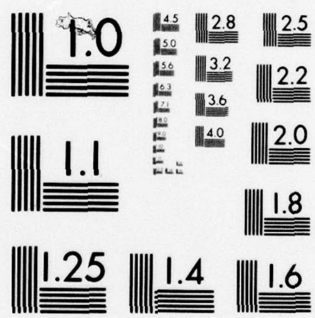


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **C-PILOT IN COMMAND** | | | | | | | | | | | | | | | | | | | | | |
| **Aviation Data continued** | | | | | | | | | | | | | | | | | | | | | |
| **Currency-Flight Hours** | | | | | | | | | | | | | | | | | | | | | |
| M/M last 24 hr. PIC | 1-51 | N | D | | | | | | | | | | | | | | | | | | |
| M/M last 24 hr. dual | 1-52 | N | D | | | | | | | | | | | | | | | | | | |
| M/M last 30 days PIC | | | | | | | | | | | | | | | | | | | 04-49 | N | D |
| M/M last 30 nite PIC | | | | | | | | | | | | | | | | | | | 04-54 | N | D |
| M/M last 90 days PIC | 1-53 | N | D | B-49 | N | D | 50-X | N | D | | | | | | | | | | 04-51 | N | D |
| M/M last 90 days dual | 1-54 | N | D | | | | | | | | | | 526 | N | D | | | | | | |
| M/M last 90 nite PIC | | | | | | | | | | | | | | | | | | | 04-56 | N | D |
| M/M total PIC | 1-55 | N | D | B-45 | | | 49-X | N | D | | | | | | | 0510 | N | D | | | |
| M/M total time dual | 1-56 | N | D | | | | | | | | | | 525 | N | D | | | | | | |
| this type 90 days PIC | | | | | | | | | | | | | 524 | N | D | | | | | | |
| this type total sim PIC | | | | | | | | | | 19-25 | N | D | | | | 0501 | N | D | | | |
| this type total PIC | | | | | | | | | | | | | 523 | N | D | 0511 | N | D | 04-45 | N | D |
| this type No. landings in last 90 days | | | | | | | | | | | | | 547 | N | D | 0512 | N | D | | | |
| gear type 90 days PIC | | | | | | | | | | | | | 528 | N | D | | | | | | |
| gear type total PIC | | | | | | | | | | | | | 527 | N | D | | | | | | |
| **Currency Checks** | | | | | | | | | | | | | | | | | | | | | |
| last check type | | | | | | | | | | | | | 512 | N | D | 0509 | N | D | | | |
| last check instruments | | | | | | | | | | | | | 515 | N | D | 0508 | N | D | | | |
| actual/sim? | | | | | | | | | | | | | 516 | A | 2 | 0514 | N | D | | | |
| **Experience by Types** | | | | | | | | | | | | | | | | | | | | | |
| single 90 days PIC | | | | | | | | | | | | | 530 | N | D | | | | | | |
| single 90 days dual | | | | | | | | | | | | | | | | | | | | | |
| single total PIC | 1-75 | N | D | | | | | | | | | | 529 | N | D | | | | | | |
| single total dual | 1-76 | N | D | | | | | | | | | | | | | | | | | | |
| multi 90 days PIC | | | | | | | | | | | | | 532 | N | D | | | | | | |
| multi 90 days dual | | | | | | | | | | | | | | | | | | | | | |
| multi total PIC | 1-77 | N | D | | | | | | | | | | 531 | N | D | | | | | | |
| multi total dual | 1-78 | N | D | | | | | | | | | | | | | | | | | | |

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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **C-PILOT IN COMMAND** | | | | | | | | | | | | | | | | | | | | | |
| **Aviation Data continued** | | | | | | | | | | | | | | | | | | | | | |
| **Flight Hours-All Types** | | | | | | | | | | | | | | | | | | | | | |
| last 24 hr day PIC | 1-81 | N | D | | | | | | | | | | | | | 0516 | N | D | | | |
| last 24 hr day dual | 1-82 | N | D | | | | | | | | | | | | | | | | | | |
| last 24 hr night PIC | 1-57 | N | D | | | | | | | | | | | | | | | | | | |
| last 24 hr night dual | 1-58 | N | D | | | | | | | | | | | | | | | | | | |
| last 24 hr act inst PIC | 1-63 | N | D | | | | | | | | | | | | | | | | | | |
| last 24 hr act inst dual | 1-64 | N | D | | | | | | | | | | | | | | | | | | |
| last 24 hr sim inst PIC | 1-69 | N | D | | | | | | | | | | | | | | | | | | |
| last 24 hr sim inst dual | 1-70 | N | D | | | | | | | | | | | | | | | | | | |
| last 24 hr anytime PIC | | | | | | | | | | 19-34 | N | D | 543 | N | D | | | | | | |
| last 3 day anytime PIC | | | | | | | | | | | | | 542 | N | D | | | | | | |
| last 30 day sim PIC | | | | | | | | | | | | | | | | | | | 05-14 | | |
| last 30 day act inst PIC | | | | | | | | | | 19-28 | N | D | 548 | N | D | 0515 | N | D | | | |
| last 30 day anytime PIC | | | | | | | | | | 19-36 | N | D | 541 | N | D | 0518 | N | D | | | |
| last 90 days day PIC | 1-83 | N | D | | | | | | | | | | | | | 0519 | N | D | | | |
| last 90 days day dual | | | | | | | | | | | | | | | | | | | | | |
| last 90 days night PIC | 1-59 | N | D | | | | | | | | | | 538 | N | D | | | | | | |
| last 90 days night dual | | | | | | | | | | | | | | | | | | | | | |
| last 90 days act inst PIC | 1-65 | N | D | | | | | | | | | | 534 | N | D | | | | | | |
| last 90 days act inst dual | 1-66 | N | D | | | | | | | | | | | | | | | | | | |
| last 90 days sim PIC | 1-71 | N | D | | | | | | | | | | 536 | N | D | | | | 05-22 | | |
| last 90 days sim daul | 1-66 | N | D | | | | | | | | | | | | | | | | | | |
| last 90 days anytime PIC | | | | B-42 | N | D | 19-34 | N | D | 51-X | N | D | 522 | N | D | | | | | | |
| total time day PIC | 1-85 | N | D | B-37 | N | D | 4-28 | N | D | 4-28 | N | D | | | | | | | | | |
| total time day dual | 1-86 | N | D | | | | | | | | | | | | | | | | | | |
| total time night PIC | 1-61 | N | D | | | | | | | 19-30 | N | D | 537 | N | D | 0516 | N | D | | | |
| total time night dual | 1-62 | N | D | | | | | | | | | | | | | | | | | | |
| total time act inst PIC | 1-67 | N | D | | | | | | | 19-17 | N | D | 533 | N | D | 0513 | N | D | | | |
| total time act inst dual | 1-68 | N | D | | | | | | | | | | | | | | | | | | |
| total time sim PIC | 1-73 | N | D | | | | | | | 19-21 | N | D | | | | | | | | | |
| total time sim dual | 1-74 | N | D | | | | | | | | | | | | | | | | | | |
| total time anytime PIC | | | | | | | 52-X | N | D | | | | | | | | | | 04-41 | N | D |

NOTE: Any other category which can be obtained by combining any of these fundamental data e.g., total night time (PIC and dual), has been omitted.

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| **C-PILOT IN COMMAND** | | | | | | | | | | | | | | | | | | | | | |
| **Aviation Data continued** | | | | | | | | | | | | | | | | | | | | | |
| **Time-Special Types** | | | | | | | | | | | | | 540 | N | D | | | | | | |
| rotor craft 90 day PIC | | | | | | | | | | | | | | | | | | | | | |
| rotor craft 90 day dual | | | | | | | | | | | | | | | | | | | | | |
| rotor craft total PIC | 1-79 | N | D | | | | | | | | | | 539 | N | D | | | | | | |
| rotor craft total dual | 1-80 | N | D | | | | | | | | | | | | | | | | | | |
| glider total PIC | 1-81 | | | | | | | | | | | | | | | | | | | | |
| glider total dual | 1-82 | | | | | | | | | | | | | | | | | | | | |
| **Source of Time** | 1-87 | A | 4 | | | | | | | | | | | | | | | | | | |
| **Training** | | | | | | | | | | | | | | | | | | | | | |
| flying school | | | | | | | | | | | | | | A | D | | | | | | |
| ATC license No. | | | | | | | | | | | | | | N | D | | | | | | |
| HQ only code | | | | | | | | | | | | | 550 | | | | | | | | |
| prime instructor | | | | | | | | | | | | | 551 | A | D | | | | | | |
| part/full time? | | | | | | | | | | | | | 552 | A | 2 | | | | | | |
| flt test examiner | | | | | | | | | | | | | 553 | A | D | | | | | | |
| license No. | | | | | | | | | | | | | 554 | A | 3 | | | | | | |
| DOT or ? | | | | | | | | | | | | | 554 | N | D | | | | | | |
| dual last 6 mo. | | | | | | | | | | | | | 555 | N | D | | | | | | |
| dual last year | | | | | | | | | | | | | 556 | N | D | | | | | | |
| **Medical Data** | | | | | | | | | | | | | | | | | | | | | |
| **Qualifications** | | | | | | | | | | | | | | | | | | | | | |
| med cert issue date | 1-45 | N | D | | | | | | | | | | | | | | | | | | |
| med cert class | 1-46 | A | D | | | | | | | 4-58 | A | 12 | 549 | A | 3 | 0522 | B | 4 | | | |
| limits/waivers | 1-47 | A | D | | | | | | | | | | 549 | A | 3 | | | | | | |

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| **C-PILOT IN COMMAND** | | | | | | | | | | | | | | | | | | | | | |
| **Medical Data continued** | | | | | | | | | | | | | | | | | | | | | |
| **Injury-Fatality** | | | | | | | | | | | | | | | | | | | | | |
| degree of injury | 1-37 | A | D | | | | | | | | | | | | | | | | | | |
| injury index-accident | | | | | | | 72-X | A | C | 8-17 | A | 6 | 314 | A | 4 | 0201 | A | 5 | 03-12 | A | 6 |
| injury index PIC | | | | | | | | | | 8-18 | A | 6 | 221 | A | 6 | 0202 | N | D | 0437 | | |
| injury index copilot | | | | | | | | | | 8-36 | A | 6 | 315 | A | 6 | 0203 | N | D | | | |
| injury index dual student | | | | | | | | | | 8-54 | A | 6 | 321 | A | 6 | 0204 | N | D | Navy codes degrees of | | |
| injury index check pilot | | | | | | | | | | 9-7 | A | 6 | 327 | A | 6 | 0205 | N | D | of injury for associated | | |
| injury index flight eng. | | | | | | | | | | 9-35 | A | 6 | 333 | A | 6 | 0206 | N | D | personnel. | | |
| injury index navigator | | | | | | | | | | 9-53 | A | 6 | 339 | A | 6 | 0207 | N | D | | | |
| injury index other (working) crew | | | | | | | | | | | | | 227 | A | 6 | 0208 | N | D | | | |
| injury index extra (non-work) crew ① | | | | | | | | | | 10-35 | A | 6 | 351 | A | 6 | 0209 | N | D | | | |
| injury index cabin crew | | | | | | | 65-X | N | D | 10-17 | A | 6 | 345 | A | 6 | | | | | | |
| cabin crew fatalities | | | | | | | 66-X | N | D | | | | | | | | | | | | |
| cabin crew on board | | | | | | | 64 | N | D | | | | | | | | | | | | |
| injury index total crew | | | | | | | | | | | | | | | | | | | | | |
| total crew injured | | | | A-44 | N | D | 63-X | N | D | | | | | | | 0200 | N | D | | | |
| total crew killed | | | | A-39 | N | D | 62-X | N | D | | | | | | | | | | | | |
| total crew on board | | | | B-55 | N | D | 61 | N | D | | | | | | | | | | | | |
| injury index passengers ① | | | | | | | | | | 10-53 | A | 6 | 233 | A | 6 | 0210 | N | D | | | |
| total passengers injured | | | | A-41 | N | D | 60-X | N | D | | | | | | | 0211 | N | D | | | |
| total passengers killed | | | | A-36 | N | D | 59-X | N | D | | | | | | | | | | | | |
| total passengers on board | | | | B-52 | N | D | 58 | N | D | | | | | | | | | | | | |
| injury index total SOB | | | | | | | | | | 11-17 | A | 6 | 357 | A | 6 | | | | | | |
| total SOB | | | | | | | 57 | N | D | | | | | | | | | | | | |
| injury index aboard other AC | | | | | | | | | | 11-35 | A | 6 | 363 | A | 6 | 0212 | N | D | | | |
| ground crew injuries | | | | | | | 67 | N | D | | | | | | | | | | | | |
| ground crew fatalities | | | | | | | 68-X | N | D | | | | | | | | | | | | |
| injury index people on ground | | | | | | | 69-X | N | D | 11-53 | A | 6 | 369 | A | 6 | 0213 | N | D | | | |
| injuries on ground | | | | B-59 | N | D | | | | | | | | | | | | | | | |
| fatalities on ground | | | | B-57 | N | D | 20-X | N | D | | | | | | | | | | | | |
| injury index FAA personnel | | | | | | | | | | 12-35 | A | 6 | | | | | | | | | |
| injury index NTSB personnel | | | | | | | | | | 12-53 | A | 6 | | | | | | | | | |
| injury index other Fed personnel | | | | | | | | | | 13-17 | A | 6 | | | | | | | | | |
| injury index Grand Total | | | | | | | | | | 12-17 | | | 375 | A | 6 | 0214 | N | D | | | |

NOTE: ① Form 6120.4 has separate Section E for name, address, function (e.g., flt eng. or passenger) and degree of injury for all occupants besides pilot/copilot.

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| **C-PILOT IN COMMAND** (1) | | | | | | | | | | | | | | | | | | | | | |
| **Medical Data Continued** | | | | | | | | | | | | | | | | | | | | | |
| **Lab Results** | | | | | | | | | | | | | | | | | | | | | |
| autopsy on who | | | | | | | | | | | | | Extensive | | | 1301 | A | 5 | | | |
| pilot autopsy ? | 1-49 | A | 2 | | | | | | | | | | data | | | 1301 | A | 5 | | | |
| med. data available? | | | | | | | | | | | | | on separate | | | 1302 | A | 3 | | | |
| incapacitation in flight | | | | | | | | | | | | | medical | | | 1303 | A | 3 | | | |
| pscho exam ? | | | | | | | | | | | | | form. | | | 1304 | A | 3 | | | |
| exposed to toxic chem. | | | | | | | | | | | | | | | | 1305 | A | 5 | | | |
| toxicology results | 1-50 | A | 2 | | | | | | | 20-17 | A | 15 | | | | 1306 | | . | | | |
| alcohol results | | | | | | | | | | 20-21 | 2 | 42 | | | | 1307 | | | | | |
| **Human Factor Data** | | | | | | | | | | | | | | | | | | | | | |
| flight duration | | | | | | | | | | 19-42 | N | D | 304 | N | D | 0108 | N | D | | | |
| on-duty time | | | | | | | | | | 19-44 | N | D | 544 | N | D | 0520 | N | D | | | |
| rest period prior flight | | | | | | | | | | 19-46 | N | D | 545 | N | D | 0521 | N | D | | | |
| hours awake since last rest | | | | | | | | | | | | | 546 | N | D | | | | | | |
| **D-Second Pilot** | This is an exact repetition of categories under PIC for most systems. GAADS carries only certificate number. | | | | | | | | | | | | | | | | | | | | |
| **E-Other Personnel** | This section has been referenced by Note under PIC. Generally it is name, address, function and injury index for each involved person besides pilot/co-pilot. The Canadians have a specific section for controllers. | | | | | | | | | | | | | | | | | | | | |
| **Air Traffic Controllers** | | | | | | | | | | | | | | | | | | | | | |
| controller age | | | | | | | | | | | | | 722 | N | D | 0565 | | | | | |
| experience at | | | | | | | | | | | | | 723 | N | D | 0569 | | | | | |
| position | | | | | | | | | | | | | | | | | | | | | |
| duty time @ occurrence | | | | | | | | | | | | | 724 | N | D | 0570 | | | | | |
| rest time before duty | | | | | | | | | | | | | 725 | A | 5 | 0571 | | | | | |
| license/qualification | | | | | | | | | | | | | 726 | A | 9 | 0566 | | | | | |
| rating | | | | | | | | | | | | | 727 | A | 9 | 0567 | | | | | |
| position occupied | | | | | | | | | | | | | 728 | A | 8 | 0568 | | | | | |
| **F-COLLISION W(1)OTHER AIRCRAFT** | | | | | | | | | | | | | | | | | | | | | |
| make/model | 2-28 | A | D | | | | | | | | | | | | | | | | | | |
| other AC tail # | 2-27 | B | D | | | | | | | 0(2)-58 | B | D | 308 | B | D | 0117 | B | D | | | |
| damage index | 2-30 | A | 4 | | | | | | | | | | | | | | | | | | |

NOTE: (1) See also NTSB 6120.4a special form on mid-air collisions.
(2) Actually part of report ID in NTSB system.

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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **G-WEATHER AT ACCIDENT SITE** | | | | | | | | | | | | | | | | | | | | | |
| type WX-general | | | | A-45 | A | 3 | 103-X | A | C | 2-25 | A | 4 | | A | 4 | 0718 | A | 4 | | | |
| type WX specific ① | | | | A-49 | A | 22 | 105-X | A | C | 1834 | A | 16 | 1018 | A | 7 | 0713 | A | 18 | | | |
| **Visibility** | | | | | | | | | | | | | | | | | | | | | |
| sky cover-clouds | 3-2 | A | 2 | | | | 110 | A | C | 18-17 | A | 10 | 1015 | A | 9 | 0710 | A | 10 | | | |
| ceiling | 3-3 | N | D | | | | 111 | B | C | 18-18 | N | D | 1007 | N | D | 0711 | N | D | | | |
| visibility | 3-9 | N | D | | | | 112 | B | C | 18-23 | A | 10 | 1008 | N | D | 0707 | A | 11 | 13-47 | N | 4 |
| RVR | | | | | | | | | | | | | | | | | | | | | |
| vision restriction | 3-11 | A | 12 | | | | 113 | A | C | 18-26 | A | 11 | 1016 | A | 12 | 0709 | A | 12 | | | |
| light conditions | 3-8 | A | 4 | A-45 | A | 5 | 107 | A | C | 2-24 | A | 5 | 110 | A | 5 | 0703 | A | 6 | 01-21 | N | C |
| **Wind** | | | | | | | | | | | | | | | | | | | | | |
| wind direction | 3-4 | N | D | | | | | | | 18-40 | N | D | 1004 | N | D | 0704 | N | D | 12-70 | N | D |
| wind velocity | 3-5 | N | D | | | | | | | 18-43 | N | D | 1005 | N | D | 0705 | N | D | 12-72 | N | D |
| gust velocity | 3-6 | N | D | | | | | | | | | | | | | | | | | | |
| wind relative to RW | | | | | | | | | | 18-27 | A | 10 | 1006 | A | 9 | 0706 | A | 10 | | | |
| turbulence | 3-7 | A | 5 | | | | | | | | | | 1028 | A | 3 | | | | | | |
| **Precip & Pressure** | | | | | | | | | | | | | | | | 0717 | N | D | | | |
| precipitation | 3-11 | A | 2 | | | | | | | 18-24 | A | 13 | 1017 | A | 11 | 0712 | A | 13 | | | |
| temperature | 3-12 | N | D | | | | | | | 18-37 | N | D | 1010 | N | D | 0714 | N | D | | | |
| dew point | 3-13 | N | D | | | | | | | | | | 1013 | N | D | | | | | | |
| dew point spread | | | | | | | | | | 18-29 | N | D | 1014 | N | D | 0715 | N | D | | | |
| density altitude | | | | | | | | | | | | | 1011 | N | D | 0716 | N | D | 12-74 | N | D |
| altimeter setting | | | | | | | | | | | | | 1012 | N | D | | | | | | |
| **Source of Information** | 3-1 | A | D | | | | | | | | | | | | | | | | | | |

**NOTE:** ① No system has a specific provision for windshear.

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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **H-FLIGHT PLAN INFO** | This is a subject under flight history in other systems. Accordingly this section is treated as flight history. | | | | | | | | | | | | | | | | | | | | |
| **Flight Preparation** | | | | | | | | | | | | | | | | | | | | | |
| **Purpose of Flight** | | | | | | | | | | | | | | | | | | | | | |
| purpose/type flying (1) | 1-33 | A | 13 | A-26 | A | 9 | 99-X | A | C | 1-39 | B | 50 | | | | 0101 | A | C | 13-20 | N | 8 |
| purpose/type flying (1) | | | | A-27 | A | 21 | 101-X | A | C | | | | | | | | | | | | |
| instructional | | | | | | | | | | | | | 211 | A | 4 | | | | | | |
| business/pleasure | | | | | | | | | | | | | 211 | A | 5 | | | | | | |
| ag/commercial | | | | | | | | | | | | | 211 | A | 11 | | | | | | |
| other | | | | | | | | | | | | | 211 | A | 5 | | | | | | |
| air carrier type | | | | | | | | | | | | | | | | 0102 | A | C | | | |
| air transport ops. | | | | | | | | | | 1-43 | A | 18 | 245 | A | 8 | 0102 | A | C | | | |
| **Flight Plan** (2) | | | | | | | | | | | | | | | | | | | | | |
| type FP filed | 3-23 | A | 5 | C-38 | N | 8 | 127 | A | C | 2-28 | A | 11 | 301 | A | 7 | 0104 | N | 11 | | | |
| orig departure pt | 3-14 | A | D | | | | | | | 3-18 | A | D | | | | | | | | | |
| dept pt=accident site? | | | | | | | | | | 3-17 | A | 2 | | | | 0106 | A | D | | | |
| intended destination | 3-17 | A | D | | | | | | | 3-60 | A | D | 215 | A | D | 0107 | A | D | | | |
| int dest=acc site? | | | | | | | | | | 3-59 | A | 2 | | | | | | | | | |
| intermediate landing pt | 3-19 | A | D | | | | | | | 3-39 | A | D | | | | | | | | | |
| = accident site | | | | | | | | | | 3-38 | A | 2 | | | | | | | | | |
| **Pre Flight Weather** | | | | | | | | | | | | | | | | | | | | | |
| yes/no | | | | | | | | | | | | | 1001 | A | 4 | 0701 | A | 4 | | | |
| from whom | 3-24 | A | D | | | | | | | 2-26 | A | 18 | 1002 | A | 8 | | | | | | |
| when | 3-25 | A | D | | | | | | | 2-26 | A | 18 | | | | | | | | | |
| where | 3-26 | A | D | | | | | | | 2-26 | A | 18 | | | | | | | | | |
| how | 3-27 | A | D | | | | | | | 2-26 | A | 18 | | | | | | | | | |
| actual vs. forecast | | | | | | | | | | 2-27 | A | 7 | 1003 | A | 3 | 1003 | A | 3 | 0702 | A | 4 |
| AIS/used | | | | | | | | | | | | | 303 | A | 4 | 0105 | B | 5 | | | |

NOTE: (1) Purpose and type flying listed under "Part B-AIRCRAFT" on NTSB 6120.4. This assumes that purpose of flight=purpose of aircraft.
(2) No system properly delineates the total flight plan, the affected leg, whether the accident occurred at an intended or emergency landing point, etc.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **H-FLIGHT PLAN INFO** | | | | | | | | | | | | | | | | | | | | | |
| **Flight Preparation continued** | | | | | | | | | | | | | | | | | | | | | |
| AC preparation | | | | | | | | | | | | | | | | | | | | | |
| service prior last TO | 3-20 | A | D | | | | | | | | | | | | | | | | | | |
| fuel on board last TO | 3-22 | N | D | | | | | | | | | | | | | | | | | | |
| type FOB last TO | 3-22 | | | | | | | | | 1-36 | A | 14 | 808 | A | B | | | | | | |
| gross wt @TO (1) | 7-1 | A | 4 | | | | | | | | | | | | | | | | | | |
| CG at TO-in limits (1) | 7-3 | A | 3 | | | | | | | | | | | | | | | | | | |
| CG fore/aft | 7-4 | A | 2 | | | | | | | | | | | | | | | | | | |
| CG left/right | 7-5 | A | 2 | | | | | | | | | | | | | | | | | | |
| **Flight Execution** | | | | | | | | | | | | | | | | | | | | | |
| departure date | 3-15 | B | D | | | | | | | | | | | | | | | | | | |
| departure time | 3-16 | N | D | | | | | | | | | | | | | | | | | | |
| ETA | 3-18 | N | D | | | | | | | | | | | | | | | | | | |
| **Type Occurrence** | | | | A-52 | A | 46 | 89-X | A | C | | | | | | | | | | | | |
| emerg circumstance | | | | | | | | | | 2-18 | A | 18 | 311 | A | 23 | 0122 | A | 23 | | | |
| 1st operational phase (2) | | | | A-50 | A | 51 | 91-X | A | C | 1-46 | B | 60 | 216 | A | D | 0110 | N | D | 13-24 | A | M |
| flight reference | | | | | | | | | | | | | | | | | | | 13-49 | A | 4 |
| 1st type occurrence (2) | | | | | | | | | | 1-44 | B | 42 | 217 | A | D | 0111 | N | D | 13-22 | A | M |
| 2nd operational phase (2) | | | | | | | | | | 1-50 | B | 60 | 218 | A | D | 0112 | N | D | 13-29 | A | M |
| 2nd type occurrence (2) | | | | | | | | | | 1-48 | B | 42 | 219 | A | D | 0113 | N | D | 13-27 | A | M |
| forced landing | | | | | | | | | | 2-17 | A | 6 | 312 | A | 5 | 0123 | A | 6 | | | |
| **Operational Details** | | | | | | | | | | | | | | | | | | | | | |
| airspace segment | | | | | | | | | | 4-24 | A | 8 | 310 | A | B | 0109 | A | 14 | | | |
| type clearance in effect | | | | | | | | | | | | | 302 | A | 4 | | | | 12-69 | N | 9 |
| AC alt ASL@1st irreg (3) | | | | | | | | | | 1-52 | N | D | 1019 (4) | N | D | | | | 13-50 | N | D |
| AC height AGL 1st irreg (3) | | | | | | | | | | | | | 1021 (4) | N | D | | | | | | |
| mode of recovery | | | | | | | | | | | | | | | | | | | | | |
| from control loss | | | | | | | | | | 2-20 | A | 3 | | | | | | | | | |
| alt ASL @ recovery (5) | | | | | | | | | | 1-57 | N | D | | | | | | | | | |
| AC speed @ occurrence (5) | | | | | | | | | | 1-62 | N | D | 305 | N | D | 0114 | N | D | | | |
| AC alt ASL @ occurrence (5) | | | | | | | | | | 1-52 | N | D | 307 | N | D | 0116 | N | D | 01-55 | N | D |
| AC alt AGL @ occurrence (5) | | | | | | | | | | | | | | | | | | | 01-52 | N | D |
| AC alt ASL @ impact | | | | | | | | | | | | | | | | | | | 13-53 | N | D |
| highest altitude flown | | | | | | | | | | | | | | | | | | | 13-56 | N | D |
| time @ highest altitude | | | | | | | | | | | | | | | | | | | 13-59 | N | D |

NOTE:
(1) This data is listed on NTSB form 6120.4 Part S.
(2) Navy accommodates 4 operational phase/operational type.
(3) Descriptions of aircraft travel here, and under accident site exam. overlap and are confusing.
(4) These data also are listed under Part T, ACCIDENT SITE EXAM.
(5) "Occurrence" as used here does not mean motion-stopping collision.

| 6120.4 Organization | 6120.4 Contents Fld Loc | A/N | C/D | Current FAA Fld Loc | A/N | C/D | GAADS Fld Loc | A/N | C/D | NTSB Fld Loc | A/N | C/D | Canada Fld Loc | A/N | C/D | ICAO Fld Loc | A/N | C/D | NAVY Fld Loc | A/N | C/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **H-FLIGHT PLAN INFO** | | | | | | | | | | | | | | | | | | | | | |
| **Flight Execution continued** | | | | | | | | | | | | | | | | | | | | | |
| **Mechanical Details** | | | | | | | | | | | | | | | | | | | | | |
| engine-part power loss | | | | | | | | | | 17-17 | A | 5 | | | | | | | | | |
| engine total power loss | | | | | | | | | | 17-18 | A | 5 | | | | | | | | | |
| sim. FO/shutdown | | | | | | | | | | 17-19 | A | 3 | | | | | | | | | |
| engine seizure | | | | | | | | | | 17-22 | A | 3 | | | | | | | | | |
| prop feather | | | | | | | | | | 17-20 | A | 3 | | | | | | | | | |
| prop feather fail | | | | | | | | | | 17-21 | A | 5 | | | | | | | | | |
| **Condition at First Problem Point** | | | | | | | | | | | | | | | | | | | | | |
| elev.gen.terrain ASL | | | | | | | | | | | | | 1020 | N | D | | | | | | |
| temperature | | | | | | | | | | | | | 1022 | N | D | | | | | | |
| dew point | | | | | | | | | | | | | 1023 | N | D | | | | | | |
| temp./d.point spread | | | | | | | | | | | | | 1024 | N | D | | | | | | |
| restricting phenomena | | | | | | | | | | | | | 1025 | N | D | | | | | | |
| precipitation | | | | | | | | | | | | | 1026 | N | D | | | | | | |
| significant weather | | | | | | | | | | | | | 1027 | N | D | | | | | | |
| turbulence | | | | | | | | | | | | | 1028 | N | D | | | | | | |
| **Airborne Weather** | | | | | | | | | | | | | | | | | | | | | |
| from whom | 3-28 | A | D | | | | | | | | | | | | | | | | | | |
| when | 3-29 | A | D | | | | | | | | | | | | | | | | | | |
| where | 3-30 | A | D | | | | | | | | | | | | | | | | | | |
| how | | | | | | | | | | | | | | | | | | | | | |
| AIS used/not | 3-31 | A | D | | | | | | | | | | 303 | A | 4 | 0106 | A | D | | | |
| actual vs. forecast | | | | | | | | | | 2-27 | A | 7 | | | | | | | | | |
| **Communications** | | | | | | | | | | | | | | | | | | | | | |
| two way comm. | | | | | | | | | | | | | 1128 | A | 3 | 0901 | A | 5 | | | |
| last grnd. stn. contact | | | | | | | | | | | | | 1129 | A | 8 | 0902 | A | 9 | | | |
| distress call (ditch) | | | | | | | | | | 28-25 | A | 4 | | | | | | | | | |
| emerg. radio after down | | | | | | | | | | 28-34 | A | 4 | | | | | | | | | |
| record ATC comm. | | | | | | | | | | | | | 1130 | A | 3 | 0904 | A | 4 | | | |
| record R.T. comm. | | | | | | | | | | | | | 1131 | A | 6 | 0903 | A | 9 | | | |

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **I-COMPONENT OR SYSTEM FAILURE** | | | | | | | | | | | | | | | | | | | | | |
| yes/no | 3-32 | | | | | | | | | | | | | | | | | | | | |
| part name | 3-33 | | | | | | | | | | | | | | | | | | | | |
| part mnfr. | 3-34 | | | | | | | | | | | | | | | | | | | | |
| part number | 3-35 | | | | | | | | | | | | | | | | | | | | |
| serial # | 3-36 | | | | | | | | | | | | | | | | | | | | |
| total time on part | 3-37 | | | | | | | | | | | | | | | | | | | | |
| TSO | 3-38 | | | | | | | | | | | | | | | | | | | | |
| **J-AIRCRAFT AND GROUND DAMAGE** | | | | | | | | | | | | | | | | | | | | | |
| degree of A/C damag | 3-39 | A | 4 | | | | 93-X | A | C | 1-34 | A | 5 | 220 | A | 5 | 0301 | A | C | 02-30 | A | 5 |
| hull damage | | | | | | | | | | 8-73 | N | D | | | | | | | | | |
| AC repair cost | | | | | | | | | | | | | | | | | | | 02-32 | N | D |
| Fire | 3-40 | A | 2 | | | | | | | | | | | | | | | | | | |
| air/ground | 3-41 | A | 2 | | | | | | | | | | | | | | | | | | |
| fire damage | | | | | | | | | | 21-27 | A | 5 | 1504 | A | 5 | 1402 | A | 5 | | | |
| History of Fire | | | | | | | | | | | | | | | | | | | | | |
| where started | | | | | | | | | | 21-19 | A | 9 | 1506 | A | 23 | 1403 | A | 12 | | | |
| when started | | | | | | | | | | | | | 1501 | A | 5 | | | | | | |
| on/after impact | | | | | | | | | | 1-35 | A | 2 | 1502 | A | 2 | 1401 | A | 3 | | | |
| ignition source | | | | | | | | | | | | | 1509 | A | 12 | | | | | | |
| combustible material | | | | | | | | | | | | | 1508 | A | 14 | | | | | | |
| spillage | | | | | | | | | | | | | 1520 | A | 6 | | | | | | |
| crash rest. fuel cells | | | | | | | | | | | | | 1521 | A | 2 | | | | | | |
| crash rest. fuel lines | | | | | | | | | | | | | 1522 | A | 2 | | | | | | |
| amount FOB | | | | | | | | | | | | | 1516 | N | D | | | | | | |
| type FOB | 3-22 | | | | | | | | | 1-36 | A | 14 | 808 | A | B | | | | | | |
| amount oil OB | | | | | | | | | | | | | 1519 | N | D | | | | | | |
| flares on board | | | | | | | | | | 21-26 | A | 3 | | | | | | | | | |

| Organization | 6120.4 Contents Fld Loc | A/N | C/D | Current FAA Fld Loc | A/N | C/D | GAADS Fld Loc | A/N | C/D | NTSB Fld Loc | A/N | C/D | Canada Fld Loc | A/N | C/D | ICAO Fld Loc | A/N | C/D | NAVY Fld Loc | A/N | C/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-AIRCRAFT AND GROUND DAMAGE | | | | | | | | | | | | | | | | | | | | | |
| Fire continued | | | | | | | | | | | | | | | | | | | | | |
| Fire Fighting-Air Borne | | | | | | | | | | | | | | | | | | | | | |
| indication of fire | | | | | | | | | | | | | 1503 | A | 5 | | | | | | |
| fire warning system | | | | | | | | | | 21-18 | A | 4 | 1505 | A | 4 | 1404 | A | 5 | | | |
| type portable airborne extinguisher used | | | | | | | | | | 21-22 | A | 8 | 1513 | A | 6 | 1408 | A | 8 | | | |
| type fixed airborne extinguisher used | | | | | | | | | | 21-21 | A | 8 | 1512 | A | 6 | 1407 | A | 8 | | | |
| effectiveness airborne extinguishing system | | | | | | | | | | 21-17 | A | 5 | 1510 | A | 5 | | | | | | |
| effectiveness crash fire inerting system | | | | | | | | | | 21-20 | A | 5 | 1511 | A | B | | | | | | |
| Fire Fighting-Ground (1) | | | | | | | | | | | | | | | | | | | | | |
| type grnd. ext. agent | | | | | | | | | | 21-24 | A | 10 | | | | 1410 | A | 17 | | | |
| effectiveness grnd eqpt | | | | | | | | | | 21-28 | A | 5 | | A | 2 | | | | | | |
| fire-distance from grnd equipmt | | | | | | | | | | | | | 1524 | N | D | | | | | | |
| ET to alert | | | | | | | | | | | | | | N | D | | | | | | |
| ET to eqpt. arrival | | | | | | | | | | | | | | N | D | | | | | | |
| ET to fire control | | | | | | | | | | | | | | N | D | | | | | | |
| distance occupants moved to clear fire | | | | | | | | | | | | | 1523 | N | D | | | | | | |
| Ground Damage | 3-42 | A | D | | | | | | | 21-43 | A | 8 | 382 | A | 8 | 0401 | A | 3 | | | |
| DOD Prop.repair cost | | | | | | | | | | | | | | | | | | | 02-45 | | |

NOTE: (1) See page 32 "Evaculation" for similar data.

| 6120.4 Organization | 6120.4 Contents Fld Loc | A/N | C/D | Current FAA Fld Loc | A/N | C/D | GAADS Fld Loc | A/N | C/D | NTSB Fld Loc | A/N | C/D | Canada Fld Loc | A/N | C/D | ICAO Fld Loc | A/N | C/D | NAVY Fld Loc | A/N | C/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **K-WRECKAGE EXAM** | | | | | | | | | | | | | | | | | | | | | |
| missing AC | | | | | | | | | | 4-23 | A | 2 | | | | 0125 | A | 2 | | | |
| wreckage examined | | | | | | | | | | | | | 1201 | A | 2 | 1201 | A | 3 | | | |
| **General Description** | | | | | | | | | | | | | | | | | | | | | |
| overall damage (1) | | | | A-47 | A | 5 | | | | | | | | | | 0301 | A | 5 | | | |
| impact damage to AC w/o passenger cabin | | | | | | | | | | 20-36 | A | 6 | 1403 (1) | A | 5 | 1505 | A | 6 | | | |
| damage cockpit | | | | | | | | | | 20-32 | A | 6 | 1404 (1) | A | 5 | 1501 | A | 6 | | | |
| damage fwd cabin | | | | | | | | | | 20-33 | A | 6 | 1405 | A | 5 | 1502 | A | 6 | | | |
| damage mid cabin | | | | | | | | | | 20-34 | | | 1406 | A | 5 | 1503 | A | 6 | | | |
| damage aft cabin | | | | | | | | | | 20-35 | | | 1407 | A | 5 | 1504 | A | 6 | | | |
| **Occupant Safety System** | | | | | | | | | | | | | | | | | | | | | |
| seat belts-#installed | 4-104 | N | D | | | | | | | | | | | | | | | | | | |
| seat belts-#used | 4-105 | N | D | | | | | | | | | | | | | | | | | | |
| seat belts-#separated | 4-106 | N | D | | | | | | | 20-41 | N | D | 1414 | N | D | | | | | | |
| seat belts failure description | 4-107 | N | D | | | | | | | | | | | | | | | | | | |
| shldr harness # installed (2) | 4-108 | N | D | | | | | | | | | | 1410 | A | 4 | 1510 | A | 6 | | | |
| shldr harness #used (2) | 4-109 | N | D | | | | | | | | | | 1411 | A | 4 | 1511 | A | 6 | | | |
| shldr harness #sep[2] | 4-110 | N | D | | | | | | | | | | | | | | | | | | |
| shldr harness failure description | 4-111 | N | D | | | | | | | | | | | | | | | | | | |
| seating configuration (3) | | | | | | | | | | 20-37 | A | 5 | | | | | | | | | |
| seats-#installed (3) | 4-112 | N | D | | | | | | | | | | | | | | | | | | |
| seats # used[5] | 4-113 | N | D | | | | | | | | | | | | | | | | | | |
| seats # separated | 4-114 | N | D | | | | | | | 27-38 | N | D | 1413 | N | D | 1507 | N | D | | | |
| seat failure description | 4-115 | N | D | | | | | | | | | | | | | | | | | | |
| **Oxygen Data (4)** | | | | | | | | | | | | | | | | | | | | | |
| oxygen on board | 4-116 | A | 2 | | | | | | | | | | | | | | | | | | |
| oxygen used | 4-117 | A | 2 | | | | | | | | | | 840 | A | 2 | | | | | | |
| cabin pressurization | 4-119 | A | 2 | | | | | | | | | | 841 | A | 2 | | | | | | |
| **Weight Balance (5)** | | | | | | | | | | | | | | | | | | | | | |
| gross wt.@occurrence | 7-2 | A | 4 | | | | | | | 21-41 | A | 5 | 804 | A | 2 | 0605 | A | 3 | | | |
| CG@occur-in limits? | 7-6 | A | 2 | | | | | | | 21-42 | A | 5 | 805 | A | 4 | 0606 | A | 5 | | | |
| fore/aft | 7-4 | A | 2 | | | | | | | | | | | | | | | | | | |
| left/right | 7-5 | A | 2 | | | | | | | | | | | | | | | | | | |

NOTE:
(1) Additional crash-kinetic data contained in Canadian crash section.
(2) Canada has more detail on pilot/copilot shoulder harness.
(3) See the Appendix page 31 for additional data on seat configuration.
(4) Also listed under "Aircraft Description" where others carry it.
(5) Weight and CG data taken from Form 6120.4 Part S. This data could also be listed under FLIGHT PLAN INFO Part H, Flight Execution Operational Details, in the case of some event where weight or CG was a factor which did not result in a crash.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| K-WRECKAGE EXAM continued | | | | | | | | | | | | | | | | | | | | | |
| Control Settings | | | | | | | | | | | | | | | | | | | | | |
| Gear ① | | | | | | | | | | | | | | | | | | | | | |
| type gear | 4-46 | | | | | | | | | 1-30 | A | 11 | 125 | A | 9 | | | | | | |
| gear position | 4-80 | A | 2 | | | | | | | | | | 854 | A | 4 | | | | | | |
| floats/ski wheel pos. | | | | | | | | | | | | | 855 | A | 2 | | | | | | |
| gear locked | 4-81 | A | 2 | | | | | | | | | | | | | | | | | | |
| gear control lever | 4-86 | A | 4 | | | | | | | | | | | | | | | | | | |
| gear indicator | 4-88 | A | 4 | | | | | | | | | | | | | | | | | | |
| Flight Controls | | | | | | | | | | | | | | | | | | | | | |
| wing flaps ? | 4-90 | A | 2 | | | | | | | | | | 856 | A | 4 | | | | | | |
| wing flaps % | 4-90 | N | D | | | | | | | | | | | | | | | | | | |
| wing flaps lever | 4-92 | A | 2 | | | | | | | | | | | | | | | | | | |
| wing flaps indicator | 4-91 | A | 2 | | | | | | | | | | | | | | | | | | |
| rudder trim tabs | 4-95 | A | 4 | | | | | | | | | | | | | | | | | | |
| rudder trim indicator | 4-101 | N | D | | | | | | | | | | | | | | | | | | |
| elevator tabs | 4-96 | N | D | | | | | | | | | | | | | | | | | | |
| elevator indicator | 4-102 | N | D | | | | | | | | | | | | | | | | | | |
| aileron trim tabs | 4-97 | A | 4 | | | | | | | | | | | | | | | | | | |
| aileron indicator | 4-103 | N | D | | | | | | | | | | | | | | | | | | |
| dual controls[1] | 4-93 | A | 4 | | | | | | | | | | | | | | | | | | |
| fuel selector pos. | 4-47 | N | D | | | | | | | | | | | | | | | | | | |
| vacuum sel. pos. | 4-48 | N | D | | | | | | | | | | | | | | | | | | |
| Specific Damage ② | | | | | | | | | | | | | | | | | | | | | |
| propellor | 4-79 | A | 8 | | | | | | | | | | | | | | | | | | |
| engine | 4-51 | A | 8 | | | | | | | | | | | | | | | | | | |
| fuselage | 4-53 | A | 8 | | | | | | | | | | | | | | | | | | |
| flight controls | 4-54 | A | 8 | | | | | | | | | | | | | | | | | | |
| engine controls | 4-55 | A | 8 | | | | | | | | | | | | | | | | | | |
| landing gear systems | 4-56 | A | 8 | | | | | | | | | | | | | | | | | | |
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| elevator stabilizer | 4-58 | A | 8 | | | | | | | | | | | | | | | | | | |
| vertical stabilizer | 4-59 | A | 8 | | | | | | | | | | | | | | | | | | |
| rudder/ruddervator | 4-60 | A | 8 | | | | | | | | | | | | | | | | | | |

NOTE: ① This data is carried under "aircraft description" in other systems.
② For each item in this category, indicate whether damage was by fire, impact, or both and specify severity on a 4-point scale.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **K-AIRCRAFT WRECKAGE** | | | | | | | | | | | | | | | | | | | | | |
| **Specific Damage continued** | | | | | | | | | | | | | | | | | | | | | |
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| elevator trims | 4-62 | | | | | | | | | | | | | | | | | | | | |
| aileron trims | 4-64 | | | | | | | | | | | | | | | | | | | | |
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| left flap | 4-65 | | | | | | | | | | | | | | | | | | | | |
| left aileron | 4-66 | | | | | | | | | | | | | | | | | | | | |
| wing struts | 4-67 | | | | | | | | | | | | | | | | | | | | |
| fuel system | 4-72 | | | | | | | | | | | | | | | | | | | | |
| oil system | 4-73 | | | | | | | | | | | | | | | | | | | | |
| electric system | 4-74 | | | | | | | | | | | | | | | | | | | | |
| hydralic system | 4-75 | | | | | | | | | | | | | | | | | | | | |
| anti-ice system | 4-76 | | | | | | | | | | | | | | | | | | | | |
| vacuum system | 4-77 | | | | | | | | | | | | | | | | | | | | |
| pneumatic system | 4-78 | | | | | | | | | | | | | | | | | | | | |
| cabin heater | 4-79 | | | | | | | | | | | | | | | | | | | | |
| other | 4-80 | | | | | | | | | | | | | | | | | | | | |
| wreckage examined | | | | | | | | | | | | | 1201 | A | 2 | | | | | | |
| **Emerg. Loc. Trans.** (1) | | | | | | | | | | | | | | | | | | | | | |
| on board (2) | 4-120 | A | 2 | A-70 | A | 2 | 120 | A | C | 21-45 | A | 5 | 1608 | A | 5 | 1526 | A | 6 | | | |
| operating? (2) | | | | A-71 | A | 2 | 121 | A | C | | | | | | | 1526 | A | 6 | | | |
| aided search | 4-12 | A | 2 | A-72 | A | 2 | | | | 21-45 | A | 5 | 1608 | A | 5 | 1526 | A | 6 | | | |
| reason ineffective | | | | | | | | | | | | | | A | 12 | | | | | | |
| activation mode | | | | | | | 122 | A | C | | | | 1609 | A | 3 | | | | | | |
| ELT location | | | | | | | | | | | | | 1610 | A | 4 | | | | | | |
| ELT type | | | | | | | | | | | | | 1611 | A | 4 | | | | | | |
| ELT make | | | | | | | | | | | | | 1613 | A | D | | | | | | |
| ELT model | | | | | | | | | | | | | | B | D | | | | | | |
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| recovery (3) | | | | | | | | | | | | | 1618 | A | 5 | 1103 | A | 5 | | | |
| operation | | | | | | | | | | 21-32 | A | 9 | 1621 | A | 7 | 1106 | A | 8 | | | |
| location | | | | | | | | | | | | | 1619 | A | 4 | 1104 | A | 5 | | | |
| recording medium | | | | | | | | | | | | | 1620 | A | 6 | 1105 | A | 7 | | | |
| # parameters | | | | | | | | | | | | | 1617 | N | D | 1102 | A | 5 | | | |
| type installed | | | | | | | | | | | | | 1616 | A | 4 | 1101 | A | 11 | | | |

NOTE: (1) CATA lists ELT, FDR, CVR under Search and Rescue.
(2) Should be under AIRCRAFT DATA, Part B of Form 6120.4.
(3) Same question repeated for Cockpit Voice Recorder in ICAO and CATA systems.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **L-COCKPIT DOCUMENTATION** | | | | | | | | | | | | | | | | | | | | | |
| This Section is Free Form. It provides for reporting the settings, frequencies etc. of the communication devices and flight and navigation instruments. No specitic devices or instruments are itemized. There is no provisions to carry any of the readings to a computerized file. Only the 6120.4 Form has clear provision for recording this type data. | | | | | | | | | | | | | | | | | | | | | |
| **M-ROTORCRAFT WRECKAGE** | | | | | | | | | | | | | | | | | | | | | |
| basicly same as part K for each component | | | | | | | | | | | | | | | | | | | | | |
| powerplant accessories | 51 | A | 8 | | | | | | | | | | | | | | | | | | |
| powerplant control systems | 53 | A | 8 | | | | | | | | | | | | | | | | | | |
| powerplant lube system | 55 | A | 8 | | | | | | | | | | | | | | | | | | |
| powerplant fuel system | 57 | A | 8 | | | | | | | | | | | | | | | | | | |
| powerplant mounts | 59 | A | 8 | | | | | | | | | | | | | | | | | | |
| rotor blades | 5-11 | A | 8 | | | | | | | | | | | | | | | | | | |
| rotor hubs | 5-13 | A | 8 | | | | | | | | | | | | | | | | | | |
| rotor masts | 5-15 | A | 8 | | | | | | | | | | | | | | | | | | |
| control system | 5-17 | A | 8 | | | | | | | | | | | | | | | | | | |
| transmission | 5-19 | A | 8 | | | | | | | | | | | | | | | | | | |
| accessory | | | | | | | | | | | | | | | | | | | | | |
| drive system | 521 | A | 8 | | | | | | | | | | | | | | | | | | |
| lube system | 523 | A | 8 | | | | | | | | | | | | | | | | | | |
| airframe cockpit | 25 | A | 8 | | | | | | | | | | | | | | | | | | |
| airframe cabin | 26 | A | 8 | | | | | | | | | | | | | | | | | | |
| tail boom pylon | 27 | A | 8 | | | | | | | | | | | | | | | | | | |
| landing gear | 28 | A | 8 | | | | | | | | | | | | | | | | | | |
| tail rotorguard | 29 | A | 8 | | | | | | | | | | | | | | | | | | |
| stabilizer | 30 | A | 8 | | | | | | | | | | | | | | | | | | |
| tail rotor blades | 31 | A | 8 | | | | | | | | | | | | | | | | | | |
| hub | 32 | A | 8 | | | | | | | | | | | | | | | | | | |
| drive system | 33 | A | 8 | | | | | | | | | | | | | | | | | | |
| control system | 34 | A | 8 | | | | | | | | | | | | | | | | | | |
| lube system | 35 | A | 8 | | | | | | | | | | | | | | | | | | |
| other electical | 36 | A | 8 | | | | | | | | | | | | | | | | | | |
| vacuum | 37 | A | 8 | | | | | | | | | | | | | | | | | | |
| hydralic | 38 | A | 8 | | | | | | | | | | | | | | | | | | |
| cabin heater | 39 | A | 8 | | | | | | | | | | | | | | | | | | |
| pneumatic | 40 | A | 8 | | | | | | | | | | | | | | | | | | |
| stabilization | 41 | A | 8 | | | | | | | | | | | | | | | | | | |

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| M-ROTORCRAFT WRECKAGE continued | | | | | | | | | | | | | | | | | | | | | |
| External Load Data | | | | | | | | | | | | | | | | | | | | | |
| how carried | 5-42 | A | 6 | | | | | | | | | | | | | | | | | | |
| Friction | | | | | | | | | | | | | | | | | | | | | |
| collective | 5-43 | A | 3 | | | | | | | | | | | | | | | | | | |
| cyclic | 5-44 | A | 3 | | | | | | | | | | | | | | | | | | |
| type landing gear (1) | 5-47 | A | D | | | | | | | | | | | | | | | | | | |
| fuel selection pos. | 5-48 | A | D | | | | | | | | | | | | | | | | | | |
| vacuum position | 5-49 | A | D | | | | | | | | | | | | | | | | | | |
| dual controls[1] | 5-50 | A | D | | | | | | | | | | | | | | | | | | |
| seat belt (2) | 5-52 | N | D | | | | | | | | | | | | | | | | | | |
| shoulder harness (2) | 5-56 | N | D | | | | | | | | | | | | | | | | | | |
| seats (2) | 5-60 | N | D | | | | | | | | | | | | | | | | | | |
| oxygen on board[1] | 5-64 | A | 2 | | | | | | | | | | | | | | | | | | |
| used (3) | 5-65 | A | 2 | | | | | | | | | | | | | | | | | | |
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| ELT on board (1) (4) | 5-67 | | | | | | | | | | | | | | | | | | | | |
| helpful? | 5-68 | | | | | | | | | | | | | | | | | | | | |
| N-COCKPIT DOCUMENTATION | 5-70 | | | | | | | | | | | | | | | | | | | | |
| | Free Form | | | | | | | | | | | | | | | | | | | | |
| Same as part L for fixed wing aircraft. | | | | | | | | | | | | | | | | | | | | | |
| O-INSTRUMENT READINGS | | | | | | | | | | | | | | | | | | | | | |
| Free Form, no instruments specified. | | | | | | | | | | | | | | | | | | | | | |

NOTE:
(1) Also listed under aircraft description where others carry it.
(2) Number installed, used, separated, failure description.
(3) Should be listed under survival.
(4) Should be under Search or Survival.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
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| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **P-POWER PLANT** | | | | | | | | | | | | | | | | | | | | | |
| control settings | Free Form No Specifics | | | | | | | | | | | | | | | | | | | | |
| power | | | | | | | | | | | | | 857 | A | 5 | | | | | | |
| mixtures | | | | | | | | | | | | | 858 | A | 4 | | | | | | |
| **Q-FLIGHT CONTROL & DEICER** | Free Form | | | | | | | | | | | | | | | | | | | | |
| carb heat | | | | | | | | | | | | | 859 | A | 4 | | | | | | |
| induction heat | | | | | | | | | | | | | 860 | A | 4 | | | | | | |
| **R-ELECTRIC PANEL & LIGHT SWITCHES** | Free Form No Specifics | | | | | | | | | | | | | | | | | | | | |
| **S-WEIGHT/CG etc.** | | | | | | | | | | | | | | | | | | | | | |
| gross wt @ T/O (1) | 71 | A | 4 | | | | | | | | | | | | | | | | | | |
| gross wt @ occurence (2) | 72 | A | 4 | | | | | | | | | | 804 | A | 2 | | | | | | |
| CG @ TO in limits (1) | 73 | A | 3 | | | | | | | | | | | | | | | | | | |
| fore/aft (1) | 74 | A | 2 | | | | | | | | | | | | | | | | | | |
| left/right (1) | 75 | A | 2 | | | | | | | | | | | | | | | | | | |
| CG @ occurrence (2) | 76 | A | 2 | | | | | | | | | | 805 | A | 4 | 0605 | A | 3 | | | |
| fore/aft (2) | 77 | A | 2 | | | | | | | | | | | | | 0606 | A | 5 | | | |
| left/right (2) | 78 | A | 2 | | | | | | | | | | | | | | | | | | |
| **T-ACCIDENT SITE EXAM** | | | | | | | | | | | | | | | | | | | | | |
| Sketch-accident & site | page 7 free form | | | | | | | | | | | | p 4 free form | | | | | | | | |

NOTE: (1) Also under Part H FLIGHT PLAN INFO-Flight Preparation-Aircraft Preparation.
(2) Also under Part K AIRCRAFT WRECKAGE EXAM - General Description - Weight and Balance.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **T-ACCIDENT SITE EXAM continued** | | | | | | | | | | | | | | | | | | | | | |
| **Terrain/Surface Description** | | | | | | | | | | | | | | | | | | | | | |
| type terrain ① | 7-9 | A | 15 | | | | | | | 4-22 | A | 13 | 1202 | A | 4 | 1202 | A | 5 | | | |
| general surface cond. | 7-11 | A | 4 | | | | | | | | | | 1203 | A | 9 | 1203 | A | 9 | | | |
| specific surface cond. | | | | | | | | | | | | | 1204 | A | 13 | 1204 | A | 13 | | | |
| **Accident Related To Usual/Potential Landing Site** | | | | | | | | | | | | | | | | | | | | | |
| on/off airport ② | 1-14 | A | 2 | | | | | | | | | | | | | | | | | | |
| type landing site | | | | | | | | | | | | | 1212 | A | 5 | | | | | | |
| proximity | | | | | | | | | | | | | 1212 | A | 9 | | | | | | |
| **Description-Any Landing Site** | | | | | | | | | | | | | | | | | | | | | |
| hazard bordering | | | | | | | | | | | | | 1218 | A | 6 | | | | | | |
| hazard height above surface | | | | | | | | | | | | | 1219 | N | D | | | | | | |
| **Description-Non Airport Site** | | | | | | | | | | | | | | | | | | | | | |
| length | | | | | | | | | | | | | 1214 | N | D | | | | | | |
| width | | | | | | | | | | | | | 1215 | N | D | | | | | | |
| water conditions | | | | | | | | | | | | | 1216 | A | 6 | | | | | | |
| water surface hazard | | | | | | | | | | | | | 1217 | A | 6 | | | | | | |
| **Description-Airport and Heliport ③** | | | | | | | | | | | | | | | | | | | | | |
| **Aircraft Approach/Impact ④** | | | | | | | | | | | | | | | | | | | | | |
| **@ Point 1st Irregularity ⑤** | | | | | | | | | | | | | | | | | | | | | |
| **@ Point 1st Contact** | | | | | | | | | | | | | | | | | | | | | |
| AC height AGL | | | | | | | | | | | | | 1205 | N | D | 1205 | N | D | | | |
| obstacle hit | | | | | | | | | | | | | | | | | | | | | |
| AC component hit | 7-12 | A | 5 | | | | | | | | | | | | | | | | | | |
| general terrain alt ASL | 7-13 | free form | | | | | | | | | | | | | | | | | | | |
| @ point final impact | 1-8 | N | D | | | | | | | 4-17 | N | D | 1020 | N | D | | | | | | |

NOTE:
① Be sure that choices include airport/normal landing surfaces.
② This data is part of ID Section of Form 6120.4.
③ See part A - airport data.
④ Kinetics of aircraft final flight are confusing -divided discontinuously between this section and FLIGHT HISTORY Part H-Flight Plan Data.
⑤ Generally interpreted as not foreign object contact - see Part H.

| 6120.4 Organization | 6120.4 Contents Fld Loc | A/N | C/D | Current FAA Fld Loc | A/N | C/D | GAADS Fld Loc | A/N | C/D | NTSB Fld Loc | A/N | C/D | Canada Fld Loc | A/N | C/D | ICAO Fld Loc | A/N | C/D | NAVY Fld Loc | A/N | C/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T-ACCIDENT SITE EXAM** | | | | | | | | | | | | | | | | | | | | | |
| **AC Approach/Impact continued** | | | | | | | | | | | | | 1 | | | | | | | | |
| **@ Point Final Impact** | | | | | | | | | | | | | | | | | | | | | |
| AC roll (REL Horizon) | | | | | | | | | | 20-64 | A | 17 | 1209 | A | 16 | | | | | | |
| AC pitch | | | | | | | | | | 20-65 | A | 15 | 1208 | A | 12 | | | | | | |
| AC yaw | | | | | | | | | | 20-66 | A | 8 | 1210 | A | 12 | | | | | | |
| terrain slope | 7-17 | A | 3 | | | | | | | | | | | | | | | | | | |
| terrain slope (up-down) | 7-18 | N | D | | | | | | | | | | | | | | | | | | |
| impact angl. rel. terrain 2 | | | | | | | | | | 20-24 | N | D | 1207 | N | D | 1213 | N | D | | | |
| impact speed 2 | | | | | | | | | | 20-67 | N | D | 0306 | N | D | 0115 | N | D | | | |
| impact severity 2 | | | | | | | | | | 20-23 | A | 5 | | | | | | | | | |
| **After Impact** | | | | | | | | | | | | | | | | | | | | | |
| moved | 7-14 | A | 2 | | | | | | | | | | | | | | | | | | |
| distance moved | 7-15 | N | D | | | | | | | | | | | | | | | | | | |
| direction moved | 7-16 | N | D | | | | | | | 20-27 | A | 6 | | | | | | | | | |
| rate decelteration | | | | | | | | | | 20-26 | A | 6 | | | | | | | | | |
| stopping distance | | | | | | | | | | 20-28 | N | D | 1206 | N | D | 1212 | N | D | | | |
| **At Rest** | | | | | | | | | | | | | | | | | | | | | |
| AC roll (rel. Horizon) | | | | | | | | | | | | | 1220 | A | 16 | 1214 | A | 18 | | | |
| AC pitch | | | | | | | | | | | | | 1221 | A | 12 | 1215 | A | 15 | | | |
| AC yaw | | | | | | | | | | | | | 1222 | A | 12 | 1216 | A | 8 | | | |
| **Wreck Rel To Ldg. Site** 4 | | | | | | | | | | | | | | | | | | | | | |
| **Pt. 1st Impact/@ Touchdown** 3 | | | | | | | | | | | | | | | | | | | | | |
| distance from threshold 2 | | | | | | | | | | | | | 1309 | N | D | 1206 | N | D | | | |
| bearing from RW heading | | | | | | | | | | | | | 1311 | N | D | 1207 | N | D | | | |
| **Pt. AC Left RW** 3 | | | | | | | | | | | | | | | | | | | | | |
| direction | | | | | | | | | | | | | 1317 | A | 3 | 1210 | A | 3 | | | |
| distance from threshold | | | | | | | | | | | | | 1318 | N | D | 1211 | N | D | | | |
| **Pt AC Came to Rest** | | | | | | | | | | | | | | | | | | | | | |
| distance from threshold | | | | | | | | | | | | | 1313 | N | D | 1208 | N | D | | | |
| bearing from RW heading | | | | | | | | | | | | | 1315 | N | D | 1209 | N | D | | | |
| dist. from ldg. site 3 | 1-16 | N | D | | | | | | | 2-31 | A | 15 | 1212 | A | 14 | | | | | | |
| direc. from ldg. site 3 | 1-15 | N | D | | | | | | | 2-32 | A | 17 | 1213 | N | D | | | | | | |
| lat. dist. from ldg. site 3 center line | | | | | | | | | | 2-33 | B | D | | | | | | | | | |

NOTE:
1 See CATA Section on Kinetics and Crashworthiness.
2 Also see page 21 WRECKAGE EXAM, Part K.
3 CATA description of wreckage vs runways like ICAO.
4 NTSB description of wreckage vs runways less precise.

| 6120.4 Organization | 6120.4 Contents Fld Loc | A/N | C/D | Current FAA Fld Loc | A/N | C/D | GAADS Fld Loc | A/N | C/D | NTSB Fld Loc | A/N | C/D | Canada Fld Loc | A/N | C/D | ICAO Fld Loc | A/N | C/D | NAVY Fld Loc | A/N | C/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **U-NARRATIVE** | page 8/9 free form | | | not coded | | | 117<br>115 char | | | 14-19<br>15-17<br>① | | | p18② | | | | | | ④ | | |
| **V-ADDITIONAL PARTICIPANTS IN INVESTIGATION** | p9 free form | | | | | | | | | | | | | | | | | | | | |
| name/address affliation | | | | | | | | | | | | | | | | | | | | | |
| **W-PRINCIPAL INVESTIGATOR** | | | | | | | | | | | | | | | | | | | | | |
| date/agency/signature | p10 free form | | | | | | | | | | | | 2112 | | | | | | | | |
| inves. by CAI # | | | | | | | | | | | | | 2101 | N | D | | | | | | |
| inves. by TI # | | | | | | | | | | | | | 2102 | N | D | | | | | | |
| assistance by DNHW | | | | | | | | | | | | | 2103 | A | 2 | | | | | | |
| assistance by HQ lab | | | | | | | | | | | | | 2104 | A | 2 | | | | | | |
| invest by correspondence | | | | | | | | | | | | | 2105 | A | 2 | | | | | | |
| other assistance | | | | | | | | | | | | | 2106 | A | D | | | | | | |
| **List Appended Documents**③ | | | | | | | | | | | | | | | | | | | | | |
| interviews | | | | | | | | | | | | | 2107 | A | 10 | | | | | | |
| reports | | | | | | | | | | | | | 2108 | A | 10 | | | | | | |
| operational data | | | | | | | | | | | | | 2109 | A | 7 | | | | | | |
| **Investigation** | | | | | | | | | | | | | | | | | | | | | |
| ET acc to invest arrival | | | | | | | | | | | | | 2110 | N | D | | | | | | |
| ET acc to regional [illegible] | | | | | | | | | | | | | 2111 | N | D | | | | | | |

**NOTE:**
① 100 characters are available for narrative unless cause factor requires an explanation, which leaves 50 for narrative.
② Coded entirely, essentially verbatim. Unlimited space is allocated in 1,000 character blocks.
③ Replace FAA Form 6120.3.
④ Navy allows 520 characters.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **Evacuation** - NTSB code sheet section | | | | | | | | | | | | | | | | | | | | | |
| oxygen sys. passengers | | | | | | | | | | 2-21 | A | 5 | | | | | | | | | |
| parachute used | | | | | | | | | | 2-22 | A | 7 | | | | | | | | | |
| seat belt sign | | | | | | | | | | | | | 1409 | A | 3 | 1509 | A | 4 | | | |
| seating configuration ① ③ | | | | | | | | | | | | | 1408 | A | 4 | 1506 | A | 5 | | | |
| **Survivability** ①②③ | | | | | | | | | | | | | 1401 | A | 4 | | | | | | |
| post crash escape① | | | | | | | | | | | | | 1402 | A | 4 | | | | | | |
| **Means/Method Exit** ① | | | | | | | | | | 20-53 | A | 13 | 1417 | A | 12 | 1515 | A | 13 | | | |
| chute - slide ① | | | | | | | | | | 20-47 | A | 4 | 1421 | A | 4 | 1519 | A | 4 | | | |
| rope① | | | | | | | | | | 20-48 | A | 3 | 1422 | A | 3 | 1520 | A | 3 | | | |
| ladder① | | | | | | | | | | 20-49 | A | 3 | 1423 | A | 3 | 1521 | A | 3 | | | |
| emerg. exit ① | | | | | | | | | | 20-50 | A | 3 | 1424 | A | 3 | 1522 | A | 3 | | | |
| emerg. light① | | | | | | | | | | 20-51 | A | 3 | 1425 | A | 3 | 1523 | A | 4 | | | |
| **Evacuation Assistance** | | | | | | | | | | | | | | | | | | | | | |
| by ground rescue group | | | | | | | | | | 20-52 | A | 4 | 1412 | A | 5 | 1512 | A | 4 | | | |
| evacuation time | | | | | | | | | | 20-63 | A | 9 | 1418 | A | 9 | 1518 | N | D | | | |
| # occupants evacuated | | | | | | | | | | 20-57 | N | D | 1419 | N | D | 1516 | N | D | | | |
| # occupants not evacuated | | | | | | | | | | 20-60 | N | D | 1420 | N | D | 1517 | N | D | | | |
| **Secondary Fatalities** | | | | | | | | | | | | | | | | | | | | | |
| burn fatalities ① ② | | | | | | | | | | 20-44 | N | D | 1415 | N | D | 1513 | N | D | | | |
| toxic fume fatalities ① ② | | | | | | | | | | | | | 1416 | N | D | 1514 | N | D | | | |
| evidence toxic gas② | | | | | | | | | | | | | 1529 | A | 2 | | | | | | |
| which gas② | | | | | | | | | | | | | 1530 | A | 11 | | | | | | |

NOTE: ① *Also under CATA Crashworthiness and Kinetics.*
② Also under CATA Medical and Human Factors.
③ Also under Part K AIRCRAFT WRECKAGE EXAM - General Description.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **Ditching and Survival** - NTSB code sheet section continued | | | | | | | | | | | | | Search | | | | | | | | |
| aircraft found by | | | | | | | | | | | | | 1602 | A | 9 | | | | | | |
| search by | | | | | | | | | | | | | 1603 | A | 6 | | | | | | |
| locating method | | | | | | | | | | | | | 1604 | A | 9 | | | | | | |
| ET accident to notice | | | | | | | | | | | | | 1605 | N | D | | | | | | |
| ET accident to finding | | | | | | | | | | | | | 1606 | N | D | | | | | | |
| NOTE: ELT data 1607-1613 (CATA) listed under AIRCRAFT WRECKAGE EXAM Part K | | | | | | | | | | | | | | | | | | | | | |
| **Ditching** | | | | | | | | | | | | | | | | | | | | | |
| distress call received (1) | | | | | | | | | | 28-25 | A | 4 | | | | | | | | | |
| water surface condition | | | | | | | | | | 2817 | A | 9 | 1426 | A | 4 | 1524 | A | 9 | | | |
| A/C structual integrity | | | | | | | | | | 2817 | A | 9 | 1426 | A | 2 | 1524 | A | 9 | | | |
| A/C floated-time | | | | | | | | | | 2826 | A | 5 | 1427 | A | 4 | 1525 | A | 5 | | | |
| for evacuation | | | | | | | | | | | | | | | | | | | | | |
| life presever | | | | | | | | | | 2828 | A | 5 | | | | | | | | | |
| life raft | | | | | | | | | | 2829 | A | 3 | | | | | | | | | |
| flares | | | | | | | | | | 2830 | A | 4 | | | | | | | | | |
| dye marker | | | | | | | | | | 2831 | A | 4 | | | | | | | | | |
| flash light | | | | | | | | | | 2832 | A | 4 | | | | | | | | | |
| mirror | | | | | | | | | | 2833 | A | 4 | | | | | | | | | |
| emergency radio (1) | | | | | | | | | | 2834 | A | 4 | | | | | | | | | |
| water temp | | | | | | | | | | 2818 | N | D | | | | | | | | | |
| time in water | | | | | | | | | | 2820 | N | D | | | | | | | | | |
| time in raft | | | | | | | | | | 2822 | N | D | | | | | | | | | |

NOTE: (1) Also under FLIGHT HISTORY - Part H, Flight Plan.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **Aerial Application** - NTSB Form 6120.4.2 | | | | | | | | | | | | | | | | | | | | | |
| accident ID | | | | | | | | | | (1) | | | (1) | | | | | | | | |
| system report # | 1 | N | D | | | | | | | 0-1 (1) | N | D | 2 (1) | N | D | | | | | | |
| location | 2 | N | D | | | | | | | 0-17 (1) | A | D | 103 (1) | A | D | | | | | | |
| date | 3 | N | D | | | | | | | 0-23 (1) | N | D | 108 (1) | N | D | | | | | | |
| time | 4 | N | D | | | | | | | 0-68 (1) | N | D | 109 (1) | N | D | | | | | | |
| **Pilot Flight Time in Ag Work** | | | | | | | | | | | | | | | | | | | | | |
| on day of accident | | | | | | | | | | | | | | | | | | | | | |
| midnite to flight | 5 | N | D | | | | | | | | | | | | | | | | | | |
| 10 day prior to flight | 6 | N | D | | | | | | | | | | | | | | | | | | |
| total ag time | 7 | N | D | | | | | | | 25-17 | N | D | 1720 | N | D | | | | | | |
| type operation | 8 | A | 20 | | | | | | | 25-21 | A | 21 | 1701 | A | 24 | | | | | | |
| kind of crop | 9 | A | 22 | | | | | | | 25-22 | A | 23 | 1702 | A | 20 | | | | | | |
| chemical used | 10 | A | 4 | | | | | | | 25-23 | A | 5 | 1703 | A | 4 | | | | | | |
| brand | 11 | A | D | | | | | | | | | | 1722 | A | D | | | | | | |
| **Toxic Exposure Pilot** | 13 | A | 4 | | | | | | | 25-24 | A | 4 | 1704 | A | 3 | | | | | | |
| duration | 15 | A | 4 | | | | | | | 25-25 | A | 9 | 1705 | A | 8 | | | | | | |
| antidotes | 16 | | | | | | | | | 25-26 | A | 4 | 1706 | A | 3 | | | | | | |
| respirator | 17 | A | 4 | | | | | | | 25-29 | A | 4 | 1708 | A | 3 | | | | | | |
| **Special Clothing** | 18 | A | 3 | | | | | | | 25-30 | A | 2 | 1710 | A | 2 | | | | | | |
| type | 19 | A | D | | | | | | | | | | | | | | | | | | |
| gloves | 20 | A | 2 | | | | | | | 25-31 | A | 2 | 1711 | A | 2 | | | | | | |
| goggles | 21 | A | 2 | | | | | | | 25-32 | A | 2 | 1712 | A | 2 | | | | | | |
| crash helmet | 22 | A | 3 | | | | | | | 25-33 | A | 3 | 1709 | A | 3 | | | | | | |
| crash bar installed | 23 | A | 2 | | | | | | | 25-35 | A | 2 | 1714 | A | 2 | | | | | | |
| crash pad installed | 24 | A | 2 | | | | | | | 25-34 | A | 2 | 1713 | A | 2 | | | | | | |
| stall warning (2) | 25 | A | 2 | | | | | | | | | | | | | | | | | | |
| tank hopper location | 26 | A | 5 | | | | | | | 25-36 | A | 8 | 1715 | A | 7 | | | | | | |
| seat belt (2) | | | | | | | | | | 25-28 | A | 5 | 1707 | A | 4 | | | | | | |
| shoulder harness (2) | | | | | | | | | | 25-27 | A | 6 | | | | | | | | | |

NOTE: (1) Actually under accident ID.
(2) Also appears in this matrix under aircraft equipment.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **Aerial Application Continued** | NTSB Form 6120.4.2 | | | | | | | | | | | | | | | | | | | | |
| **Operational Data** | | | | | | | | | | | | | | | | | | | | | |
| length of run | 28 | N | D | | | | | | | | | | | | | | | | | | |
| height AGL | 29 | N | D | | | | | | | | | | | | | | | | | | |
| how flown | 32 | N | 5 | | | | | | | 25-48 | A | 5 | 1718 | A | 4 | | | | | | |
| procedure turn | 33 | N | 5 | | | | | | | 25-49 | A | 4 | 1719 | A | 4 | | | | | | |
| **Elevation** | | | | | | | | | | | | | | | | | | | | | |
| swath run | 30 | N | D | | | | | | | 25-37 | N | D | | | | | | | | | |
| accident site | 31 | N | D | | | | | | | 4-17 (1) | N | D | | | | | | | | | |
| **Type Terrain** | 34 | A | 6 | | | | | | | 25-45 | A | | 1717 | A | | | | | | | |
| obstructions | 35 | A | 6 | | | | | | | 25-42 | A | | 1716 | A | | | | | | | |

NOTE: (1) Taken from Part T, SITE EXAM.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **Mid-Air Collision - NTSB Form 6120.4A** | | | | | | | | | | | | | | | | | | | | | |
| **Aircraft Description** | | | | | | | | | | | | | | | | | | | | | |
| aircraft "A" tail # (1) | 1 | | | A-65 | B | D | | | | 0-7 | B | D | | | | | | | | | |
| aircraft "A" color | 2 | | | | | | | | | | | | | | | | | | | | |
| aircraft "B" tail # (2) | 3 | | | | | | | | | 0-58 | B | D | 308 | B | D | | | | | | |
| aircraft "B" color | 4 | | | | | | | | | | | | | | | | | | | | |
| aircraft classifications | | | | | | | | | | 27-17 | A | 8 | | | | | | | | | |
| **Flight Description** | | | | | | | | | | | | | | | | | | | | | |
| "A" airspeed | 5 | N | D | | | | | | | | | | | | | | | | | | |
| "B" airspeed | 6 | N | D | | | | | | | | | | | | | | | | | | |
| "A" altitude | 9 | N | D | | | | | | | | | | | | | | | | | | |
| "B" altitude | 10 | N | D | | | | | | | | | | | | | | | | | | |
| **Horizontal** | | | | | | | | | | | | | | | | | | | | | |
| "A" mag leading | 7 | N | D | | | | | | | 27-24 | N | D | | | | | | | | | |
| "B" mag heading | 8 | N | D | | | | | | | | | | | | | | | | | | |
| "A" convergence angle | 11 | N | D | | | | | | | 27-27 | N | D | | | | 0114 | N | D | | | |
| "B" convergence angle | 12 | N | D | | | | | | | | | | | | | | | | | | |
| collision angle | 13 | | | | | | | | | 27-30 | N | D | | | | 0120 | N | D | | | |
| **Vertical** | | | | | | | | | | | | | | | | | | | | | |
| "A" climb/dive | 14 | A | 4 | | | | | | | | | | | | | | | | | | |
| "B" climb/dive | 15 | A | 4 | | | | | | | | | | | | | | | | | | |
| "A" convergence angle | 16 | N | D | | | | | | | | | | | | | | | | | | |
| "B" convergence angle | 17 | N | D | | | | | | | | | | | | | | | | | | |
| collision angle | 18 | N | D | | | | | | | 27-33 | N | D | | | | 0121 | N | D | | | |
| evasive action taken | | | | | | | | | | 27-36 | A | 3 | 309 | A | 3 | 0118 | A | 3 | | | |
| **Airspace/Control** | | | | | | | | | | | | | | | | | | | | | |
| in-comm/with terminal | | | | | | | | | | 27-18 | A | 2 | | | | | | | | | |
| controlled by (3) | | | | | | | | | | 27-19 | A | 12 | | | | | | | | | |
| radar control (3) | | | | | | | | | | 27-20 | A | 5 | | | | | | | | | |
| advised of traffic | | | | | | | | | | 27-21 | A | 12 | | | | | | | | | |
| **Misc** | | | | | | | | | | | | | | | | | | | | | |
| anti-collision lights (5) | | | | | | | | | | 27-37 | A | 4 | | | | | | | | | |
| simulated instrument training (4) | | | | | | | | | | 27-38 | A | 2 | | | | | | | | | |
| military involvement | | | | | | | | | | 27-39 | A | 7 | 381 | A | 2 | | | | | | |
| military type | | | | | | | | | | 27-40 | A | 10 | | | | | | | | | |

NOTE: (1) Actually appears in ID portion unless a separate mid-air collision form is used.
(2) Also listed in Part F COLLISION WITH OTHER AIRCRAFT.
(3) Should appear under Part H. FLIGHT PLAN INFO, Flight Execution, Communications.
(4) Should appear under Part H. FLIGHT PLAN INFO, Flight Preparation, Purpose.
(5) Should appear under Part B. AIRCRAFT DATA, System Description, Safety Systems.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **Cause Factor** | | | | | | | | | | | | | | | | | | | | | |
| The several systems differ markedly in their accommodation of cause factors. The NTSB form 6120.4 does not provide space for investigators to state cause factors. The cause factors are assigned by the analyst/coder. The FAA and GAADS computer record each will accommodate 2 cause factors. The NTSB system will accept a maximum of 10, ICAO a maximum of 13, the U.S. Navy a maximum of 7. Canada does not computerize the cause factor but does provide space in the investigation form for investigator discussion of cause. ICAO has followed NTSB in adopting the "first event, second event" analysis with causes contributing to either "event". This section is ordered according to the NTSB cause factor codes. See FAA breakdown on the next page. | | | | | | | | | | | | | | | | | | | | | |
| **People** | | | | | | | | | | | | | | | | | | | | | |
| who responsible | | | | | | | | | | 6-17 | B | 19 | | | | | | | | | |
| perpetrating action (1) | | | | | | | | | | 6-20 | N | 1 | | | | | | | | | |
| **Machines** | | | | | | | | | | | | | | | | | | | | | |
| engine involvement | | | | | | | | | | | | | | | | | | | 13-74 | | |
| main component or | | | | | | | | | | | | | | | | | | | | | |
| system responsible (2) | | | | | | | | | | 6-17 | B | 48 | | | | | | | | | |
| subsystem responsible | | | | | | | | | | 6-20 | A | C | | | | | | | | | |
| **Airway/Airport Facility** | | | | | | | | | | | | | | | | | | | | | |
| type | | | | | | | | | | 6-17 | B | 3 | | | | | | | | | |
| aspect/action (3) | | | | | | | | | | 6-20 | A | C | | | | | | | 13-67 | | |
| **Weather Factor?** | | | | | | | | | | 6-17 | N | 1 | | | | | | | | | |
| what kind | | | | | | | | | | 6-19 | A | 24 | | | | | | | 13-63 | | |
| **Terrain Problem?** | | | | | | | | | | | | | | | | | | | | | |
| (off airport) | | | | | | | | | | 6-17 | N | 1 | | | | | | | | | |
| kind of terrain | | | | | | | | | | 6-19 | A | 12 | | | | | | | | | |
| **Misc Acts/Conditions** (4) | | | | | | | | | | 6-17 | N | 1 | | | | | | | | | |
| more specific | | | | | | | | | | 6-19 | B | 172 | | | | | | | | | |
| **Environmental Factor** | | | | | | | | | | | | | | | | | | | 13-71 | | |
| **Elaboration/Explanation** (5) | | | | | | | | | | 15-77 | A | D | | | | | | | | | |

NOTE:
(1) Number and selection of choice varies with person responsible - total of 129.
(2) 378 total subsystems, 35 unique to rotorcraft. Number and selection varies with component.
(3) Number and selection varies with type facility, 133 total.
(4) These are generally improper procedures or unavoidable natural misfortunes.
(5) Fifty characters of the 98 available for narrative may be used to describe a cause not covered adequately by an existing choice.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| Cause Factors continued | This page presents the FAA and Canadian organization of cause factors. The FAA organization is different from that of the NTSB which is described on the previous page. | | | | | | | | | | | | | | | | | | | | |
| **FAA** | | | | | | | | | | | | | | | | | | | | | |
| general cause category | | | | A-64 | N | 9 | 95-X | A | C | | | | | | | | | | 12-12 | B | 24 |
| Operational Cause Factor ① | | | | A-54 | A | 107 | 74-X | A | C | | | | | | | | | | | | |
| contributing cause | | | | A-56 | A | 26 | 75-X | A | C | | | | | | | | | | | | |
| pilot incapacitation | | | | | | | | | | | | | | | | | | | 12-30 | N | 8 |
| person involved | | | | A-57 | A | 16 | 77-X | B | C | | | | | | | | | | 12-19 | N | 5 |
| type error | | | | A-58 | A | 20 | | | | | | | | | | | | | 12-22 | B | M |
| supporting factor | | | | | | | 79-X | A | C | | | | | | | | | | 12-28 | | |
| Technical Cause Factor ②③ | Numbers are from the Airline Transport Association's (ATA) specifications for manufacturers technical data. This is the closest thing to a world wide standard for systematic description of systems and parts. | | | | | | | | | | | | | | | | | | | | |
| system chapter | | | | A-54 | N | 41 | 74-X | | | | | | | | | | | | | | |
| subsystem section ④ | | | | A-56 | N | 300 | 73-X | | | | | | | | | | | | | | |
| problem with part | | | | A-58 | A | 22 | 79-X | | | | | | | | | | | | | | |
| Transports Canada | | | | | | | | | | | | | | | | | | | | | |
| Analysis of Occurrance | | | | | | | | | | | | | | | | | | | | | |
| why | | | | | | | | | | | | | p. 19 free text | | | | | | | | |
| findings | | | | | | | | | | | | | p. 20 free text | | | | | | | | |
| how presented | | | | | | | | | | | | | p. 20 free text | | | | | | | | |
| safety proposals | | | | | | | | | | | | | p. 20 free text | | | | | | | | |
| synopsis ⑤ | | | | | | | | | | | | | p. 20 free text 6 lines | | | | | | | | |

NOTE:
① Describe what was done wrong by a person.
② Describe what went wrong with the machine.
③ Part numbers and system numbers correlate with those in the FAA Service Difficulty Reporting System which stores maintenance problems.
④ Subsystem number and selection vary among hundreds of systems.
⑤ The synopsis is intended as a news release on the accident.

| 6120.4 Organization | 6120.4 Contents | | | Current FAA | | | GAADS | | | NTSB | | | Canada | | | ICAO | | | NAVY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D | Fld Loc | A/N | C/D |
| **Remedial Action Taken** | | | | | | | | | | | | | | | | | | | | | |
| **Responsible Party** | | | | C-44 | A | 26 | | | | | | | | | | | | | | | |
| **Action Taken** | | | | C-45 | A | 11 | | | | | | | | | | 1701 (1) | A | 3 | | | |
| action planned | | | | C-45 | N | 11 | | | | | | | | | | | | | | | |
| first rem. action area | | | | | | | 128 | A | C | | | | | | | | | | | | |
| first rem. action taken | | | | | | | 130 | A | C | | | | | | | | | | | | |
| second rem. action area | | | | | | | 132 | A | C | | | | | | | | | | | | |
| second rem. action taken | | | | | | | 134 | A | C | | | | | | | | | | | | |
| related reports | | | | | | | 136 | A | C | | | | | | | | | | | | |
| related UCR No. | | | | | | | | | | | | | | | | | | | 01-17 | | |
| extent of investigation | | | | | | | 137 | A | C | | | | | | | | | | | | |
| notification method | | | | | | | 138 | A | C | | | | | | | | | | | | |
| source of data | | | | | | | | | | | | | | | | | | | 01-14 | N | C |

**NOTE:** (1) Describe remedial action in remarks.

# APPENDIX B

# ACCIDENT DATA USER SURVEY QUESTIONNAIRE

ERRATA

Report No. FAA-NA-79-172

ACCIDENT DATA SYSTEMS STUDY
*REQUIREMENTS ANALYSIS FOR AN*
FAA ACCIDENT DATA SYSTEM

August 1979
NAFEC Report

Prepared for

U.S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Flight Standards Service

by

National Aviation Facilities Experimental Center
Atlantic City, New Jersey 08405

* Appendix B: Insert pages B-2 to B-15
***Inserted by: pfcooper. DTIC/DDA-2, 23 Oct.'79**

Released October 3, 1979

## INTRODUCTION

This survey is part of a larger project to improve the FAA General Aviation Accident Information System. The effort has been requested by the Flight Standards Service Safety Analysis Staff, AFS-80, and is being accomplished by NAFEC.

The improved system should better meet your needs in a more timely fashion. In order to develop a better system we must know what information is needed by users of aircraft accident data, and what is not. This questionaire is designed to help us learn what is needed.

Much of the questionaire is multiple choice, and some parts are optional. The appendix contains sample products from other accident systems.

Your response will guide us in our efforts toward an improved General Aviation Accident Data System.

AVIATION ACCIDENT DATA USER QUESTIONAIRE

I. General Information

A. Personal Description

1. Name (optional) ______________________________

2. Job Title ______________________________

3. Organization ______________________________

4. Describe your experience and education in aviation accident investigation, computers/data processing, statistical analysis/math.

5. Are you a pilot? _______yes _______no

6. Ratings______________________________

7. Approximate total hours logged ______________________

8. Indicate your interests among the following:

a. flight operations ________ b. regulations _______

c. maintenance/engineering______________________

d. medical/human factors ______________________

e. others ____________

B. Use of Accident Data

1. Do you use aircraft accident information in your duties?

_________yes __________no

2. If yes, how often?(daily/weekly?)____________________

| Originator | Date | Quantity | APPROVED |
|---|---|---|---|
| ANA-230 | 12/18/78 | 150 | FORM |

3. If you might use accident data, but don't, is it because:

a. Don't know what is available _____

b. Hard to get what is available ____

c. The available data is not what you need ________

d. Other ____________________________________

II. System Contents and Capabilities

A. Which of the following accident data systems do you use?

(Number in order of use, if you use more than one)

a. FAA_____ b. NTSB_____ c. ICAO_____ d. other_____

B. Frequency of Use - Answer the following for system #1.

1. How often do you refer to standard system publications?

| daily | weekly | monthly | yearly | never |
|---|---|---|---|---|
| _____ | _____ | _____ | _____ | _____ |

2. How often do you make specific inquires for information not in the routine publications?

| daily | weekly | monthly | yearly | never |
|---|---|---|---|---|
| _____ | _____ | _____ | _____ | _____ |

C. Answer the following for system #2, if any

1. How often do you refer to standard system publications?

| daily | weekly | monthly | yearly | never |
|---|---|---|---|---|
| _____ | _____ | _____ | _____ | _____ |

2. How often do you make specific inquires for information not in the routine publications?

D. Satisfaction with system

(Section E provides for comment on these items.)

1. Does the accident data system you now use satisfy your needs? _____yes ______no

2. Selection Ability - Can the system select the type accident reports you want according to your specified search criteria?

_____yes _____no _____never tried

3. Presentation Capability - Does the system present its data in a format(s) useful to you?

_____yes _____no

4. Narrative - Do your computer generated accident reports contain the proper amount of narrative?

_____right amount _____too much _____too little

5. Response time - How long must you wait to get a specially requested output in hand?

(# hours, days,?)_____________________

6. Data Elements - Do your computer accident records contain enough of the accident facts you are interested in? _____yes _____no

E. System Improvements Questions match those in section D

1. See question D-1. If your answer was no, can you suggest improvements?

2. Can you suggest enhancements in your systems search and selection capability?

3. Can you suggest improvements in output format or presentation capability?

4. Do you prefer a computer printed narrative:

____ exactly as written by the accident investigator

____ summarized for the computer by the investigator

____ summarized for the computer by an aviation safety analyst, not the investigator.

5. What response time do you need? (use #s) ______________

6. Computer data records and accident data forms

a. Should the computer accident record have

____ more ____less ____ same number of accident facts as it now has?

b. Can you suggest facts to be added to or dropped from the computer record? (e.g. forecasted vs. actual weather)

c. Can you suggest facts to be added to or deleted from the accident report itself? (e.g. name of flight instructor of a low time pilot involved in an accident)

d. It appears that a new FAA accident investigation form with multiple choice questions could be quicker to complete in the field, collect more data, and make for easier computer entry. It would not increase investigator workload if they complete a fresh NTSB Form 6120.4 in the office rather than using the original in the report. Please get an answer from every accident investigator in your office and give us a tally.

When you return from an accident investigation, do you make out a new clean copy of Form 6120.4 to submit rather than sending off the original you filled out in the field? _____ yes (how many) _____ no (how many)

7. Process Capability Some systems figure averages and percents, draw graphs, calculate standard deviations and other statistical indices etc. Please list any functions you would like added to your accident data system. (See in App. I sample outputs you may never have seen from other accident systems.)

8. Alerting Algorithms The FAA Service Difficulty Reporting system (maintenance problems) has computer logic to detect trends indicative of possible problems. Do you think some kind of "automatic alert" mechanism in an accident data system would be helpful to you?

____ yes ____ no ____ no opinion

F. Results

1. When you identify a safety problem, what action is taken? e.g. Airworthiness Directive issued, new regulation proposed, etc.

2. Could more complete accident data and better presentation and analysis improve the chances of

   a. identifying unrecognized safety problems

      _____yes _____no

   b. initiating action to correct problems

      _____yes _____no

3. What other means can you suggest to:

   a. identify safety problems

   b. initiate corrective action

III. Publications Used

We need to know which accident data system routine outputs you are familiar with, receive and use. Please indicate.

| Name | Familiarity | | Availability | | Use | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Have Seen | Never Seen | Receive | No | daily | weekly | monthly | yearly | never |
| **A. FAA** | | | | | | | | | |
| 1. OKC Monthly | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 2. OKC Quarterly | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 3. OKC Special | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| **B. NTSB** | | | | | | | | | |
| 1. Air Carrier Annual Review | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 2. General Aviation Annual Review | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 3. Bimonthly Briefs | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 4. Major Accident Board Report | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 5. Special Study | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| **C. ICAO** | | | | | | | | | |
| 1. Monthly Summary | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 2. Prelim Reports | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 3. Full Reports | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| 4. Special Study | ____ | ____ | ____ | __ | ____ | ____ | ____ | ____ | ____ |
| **D. Other?** ______________ | | | | | | | | | |

IV. Publication Specifics

In Section III you told us which accident data outputs you have seen and/or use. Please review for us as many FAA and NTSB outputs as you can. There follows onw multiple choice checklist for each routine publication of each major system.

Please grade the utility to you of each publication you use. Mark "would use if" for those items you can constructively criticize, and comment on a separate sheet.

A. FAA Accident Information System

1. GA Accident Statistical Summary (annual) FS-8020-21

| Data Presentations | most useful | very useful | useful | little use | no use | would use if |
|---|---|---|---|---|---|---|
| a. overall summary | ____ | ____ | ____ | ____ | ____ | ____ |
| b. personal acts | ____ | ____ | ____ | ____ | ____ | ____ |
| c. technical factors | ____ | ____ | ____ | ____ | ____ | ____ |
| d. types of accidents | ____ | ____ | ____ | ____ | ____ | ____ |
| e. make/model | ____ | ____ | ____ | ____ | ____ | ____ |
| f. by region | ____ | ____ | ____ | ____ | ____ | ____ |
| g. air taxi by make/model | ____ | ____ | ____ | ____ | ____ | ____ |
| h. air taxi by cause | ____ | ____ | ____ | ____ | ____ | ____ |
| **Charts** | | | | | | |
| i. factor cites | ____ | ____ | ____ | ____ | ____ | ____ |
| j. phase of flight | ____ | ____ | ____ | ____ | ____ | ____ |
| k. activity involved | ____ | ____ | ____ | ____ | ____ | ____ |
| l. pilot certificate | ____ | ____ | ____ | ____ | ____ | ____ |
| m. rates/fatal | ____ | ____ | ____ | ____ | ____ | ____ |

2. GA Quarterly Report

| Data Presentations | most useful | very useful | useful | little use | no use | would use if |
|---|---|---|---|---|---|---|
| a. operation/injury/pilot FS-8020-40 | ___ | ___ | ___ | ___ | ___ | ___ |
| b. phase of flight/region FS-8020-39 | ___ | ___ | ___ | ___ | ___ | ___ |
| c. type accident FS-8020-40 | ___ | ___ | ___ | ___ | ___ | ___ |
| d. operational cause factor FS-8020-38 | ___ | ___ | ___ | ___ | ___ | ___ |
| e. technical cause factor FS-8020-37 | ___ | ___ | ___ | ___ | ___ | ___ |

3. GA Monthly Report

| | | | | | | |
|---|---|---|---|---|---|---|
| a. GA accident master FS-8020-29 | ___ | ___ | ___ | ___ | ___ | ___ |
| b. make/model FS-8020-32 | ___ | ___ | ___ | ___ | ___ | ___ |
| c. region/district FS-8020-30 | ___ | ___ | ___ | ___ | ___ | ___ |
| d. cause factor FS-8020-31 | ___ | ___ | ___ | ___ | ___ | ___ |
| e. fatals FS-8020-43 | ___ | ___ | ___ | ___ | ___ | ___ |

B. NTSB

1. Annual Review of Aircraft Accident Data U.S. General Aviation

a. Which of the sections do you use? (1) All Ops ______

(2) Small Fixed Wing ____ (3) Large Fixed Wing ____

(4) Rotorcraft _____ (5) Glider ______ (6) Collisions ____

Each of these sections has the same presentations of data for accidents involving that type aircraft. Our examples are taken from the "All Ops" section which has a few more presentations that other sections.

b. Aircraft Damage Several presentations compare aircraft damage with another variable - e.g. type of accident (App. II, p 1), phase of operation, type of flying or state of occurrence (App II, p 2). Please grade the utility of these presentations.

Utility of Aircraft Damage vs. Another Variable

| variable | most useful | very useful | useful | little use | no use | would use if |
|---|---|---|---|---|---|---|
| (1) type of accident | ____ | ____ | ____ | ____ | ____ | ____ |
| (2) phase of operation | ____ | ____ | ____ | ____ | ____ | ____ |
| (3) kind of flying | ____ | ____ | ____ | ____ | ____ | ____ |

c. Injury Index These variables just discussed, and many others, are compared with injury index. (Example of injury index and kind of flying is App. II, p 3. Injury index and pilot age is App. II, p 4.) Please grade the utility of such presentations.

Utility of Injury Index vs. Another Variable

| variable | most useful | very useful | useful | little use | no use | would use if |
|---|---|---|---|---|---|---|
| (1) type of accident | ___ | ___ | ___ | ___ | ___ | ___ |
| (2) phase of operation | ___ | ___ | ___ | ___ | ___ | ___ |
| (3) kind of flying | ___ | ___ | ___ | ___ | ___ | ___ |
| (4) state of occurrence | ___ | ___ | ___ | ___ | ___ | ___ |
| (5) type of weather | ___ | ___ | ___ | ___ | ___ | ___ |
| (6) month of occurrence | ___ | ___ | ___ | ___ | ___ | ___ |
| (7) light conditions | ___ | ___ | ___ | ___ | ___ | ___ |
| (8) pilot certificate | ___ | ___ | ___ | ___ | ___ | ___ |
| (9) pilot age | ___ | ___ | ___ | ___ | ___ | ___ |
| (10) type of aircraft | ___ | ___ | ___ | ___ | ___ | ___ |
| (11) type of power | ___ | ___ | ___ | ___ | ___ | ___ |
| (12) type of flight plan | ___ | ___ | ___ | ___ | ___ | ___ |
| (13) airport proximity | ___ | ___ | ___ | ___ | ___ | ___ |
| (14) fire after impact | ___ | ___ | ___ | ___ | ___ | ___ |

d. Another type presentation is a table for each of several types of flying. Each table shows the number and percent of accidents (and of fatal accidents) where that particular type flying was underway and a particular cause factor was involved - for every possible codeable cause factor. (App II, p 5 is an example of pleasure flying accidents with different cause factors.)

Please grade the utility of such tables of cause factors for each type of flying:

| variable | most useful | very useful | useful | little use | no use | would use if |
|---|---|---|---|---|---|---|
| (1) broad cause factors | ____ | ____ | ____ | ____ | ____ | ____ |
| (2) instructional flying | ____ | ____ | ____ | ____ | ____ | ____ |
| (3) pleasure flying | ____ | ____ | ____ | ____ | ____ | ____ |
| (4) business flying | ____ | ____ | ____ | ____ | ____ | ____ |
| (5) corporate/executive flying | ____ | ____ | ____ | ____ | ____ | ____ |
| (6) aerial applications | ____ | ____ | ____ | ____ | ____ | ____ |
| (7) air taxi | ____ | ____ | ____ | ____ | ____ | ____ |

e. Yet another presentation shows the number and severity of injuries to personnel (pilot, flight engineer, passengers etc.) for 36 types of flying. (These are called "injury tables" in the review table of contents.) (See App. II, p 6.) Do you find such a presentation

____ most useful ____ very useful ____ useful

_____ little use ____ no use ____ would use if

2. Aircraft Accident Reports - Brief Formats (Bimonthly)

The following tables appear at the front of each bimonthly collection of briefs. (App. II, p 7 is an example of type of accident vs. injury index.)

Please grade the utility of these tables.

a. Bimonthly Briefs - Accident Correlations

| presentation | most useful | very useful | useful | little use | no use | would use if |
|---|---|---|---|---|---|---|
| (1) type aircraft vs. light conditions | ____ | ____ | ____ | ____ | ____ | ____ |
| (2) kind of flying vs. pilot certificate | ____ | ____ | ____ | ____ | ____ | ____ |
| (3) kind of flying vs. injury index | ____ | ____ | ____ | ____ | ____ | ____ |
| (4) type of accident vs. injury index | ____ | ____ | ____ | ____ | ____ | ____ |
| (5) type of accident vs. aircraft damage | ____ | ____ | ____ | ____ | ____ | ____ |
| (6) type of accident vs. pilot certificate | ____ | ____ | ____ | ____ | ____ | ____ |
| (7) operational phase vs. injury index | ____ | ____ | ____ | ____ | ____ | ____ |
| (8) crew & passengers vs. injury level for aircraft category | ____ | ____ | ____ | ____ | ____ | ____ |
| (9) injuries vs. type accident | ____ | ____ | ____ | ____ | ____ | ____ |
| (10) injuries vs. type flying | ____ | ____ | ____ | ____ | ____ | ____ |
| (11) number of accidents for each cause factor | ____ | ____ | ____ | ____ | ____ | ____ |

b. Brief Summary of the Accident Report

A sample page from the accident briefs is shown in App. II, p 8.

Please indicate the utility of this presentation.

____ most useful ____ very useful ____ useful

____ little use ____ no use ____ would use if.

C. ICAO

1. Preliminary Reports Summary (Monthly)

This is the only periodic regular publication of the ICAO ADREP system presently. A sample is shown in App. II, p 9. Please compare it with the NTSB brief or any other report summary you may be familiar with as you grade it: _____ most useful ____ very useful

_____ useful ____ little use ____ no use

_____ would use if

# APPENDIX C

## USER CRITIQUE OF CURRENT SYSTEM OUTPUTS

ACCIDENT SYSTEM PUBLICATIONS USED

General Aviation and Flight Standards District Office Responses

| | Total Response | Familiarity: Have Seen | Familiarity: Never Seen | Availability: Receive | Availability: No | Use: Daily | Use: Weekly | Use: Monthly | Use: Yearly | Use: Never |
|---|---|---|---|---|---|---|---|---|---|---|
| FAA | | | | | | | | | | |
| 1. OKC Monthly | 60 | 22 | 38 | 14 | 31 | 2 | 1 | 7 | 1 | 16 |
| 2. OKC Quarterly | 65 | 29 | 36 | 16 | 28 | 1 | – | 4 | 10 | 15 |
| 3. OKC Special | 59 | 19 | 40 | 7 | 32 | 1 | – | 2 | 2 | 15 |
| NTSB | | | | | | | | | | |
| 1. Air Carrier Annual Review | 56 | 49 | 7 | 46 | 6 | – | 1 | 11 | 17 | 12 |
| 2. General Aviation Annual Review | 59 | 56 | 3 | 50 | 5 | 2 | 7 | 18 | 17 | 2 |
| 3. Bimonthly Briefs | 50 | 35 | 15 | 25 | 14 | 1 | 2 | 14 | 5 | 6 |
| 4. Major Accident Board Report | 57 | 54 | 3 | 49 | 3 | 3 | 2 | 21 | 10 | 4 |
| 5. Special Study | 53 | 46 | 7 | 40 | 7 | 2 | 3 | 12 | 11 | 6 |
| ICAO | | | | | | | | | | |
| 1. Monthly Summary | 54 | 10 | 44 | 4 | 25 | – | – | 1 | 2 | 17 |
| 2. Prelim Reports | 52 | 7 | 45 | 3 | 24 | – | 1 | – | 1 | 18 |
| 3. Full Reports | 51 | 7 | 44 | 4 | 23 | – | – | – | 1 | 17 |
| 4. Special Study | 51 | 6 | 45 | 3 | 25 | – | – | – | 1 | 17 |

FAA ACCIDENT INFORMATION SYSTEM

GA ACCIDENT STATISTICAL SUMMARY (ANNUAL) FS-8020-21

General Aviation and Flight Standards District Office Responses

| Data Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| Overall summary | 16 | 14 | 16 | 12 | 0 | 3 |
| Personal acts | 16 | 15 | 15 | 8 | 0 | 4 (a) |
| Technical factors | 10 | 11 | 22 | 11 | 0 | 3 (a) |
| Types of accidents | 17 | 19 | 16 | 6 | 1 | 4 |
| Make/model | 6 | 17 | 22 | 8 | 2 | 4 |
| By region | 3 | 9 | 21 | 17 | 2 | 4 (a) |
| Air taxi by make/model | 9 | 16 | 19 | 9 | 3 | 5 (a) (b) |
| Air taxi by cause | 14 | 20 | 19 | 5 | 0 | 4 |
| Charts | | | | | | |
| Factor cities | 12 | 12 | 19 | 8 | 2 | 4 |
| Phase of flight | 15 | 19 | 16 | 6 | 1 | 4 |
| Activity involved | 11 | 23 | 14 | 6 | 1 | 4 |
| Pilot certificate | 7 | 14 | 22 | 13 | 1 | 4 |
| Rates/fatal | 11 | 11 | 23 | 11 | 0 | 4 |

(a)---If I knew what was available
(b)---If the number of accidents were compared with the number in operation

FAA ACCIDENT INFORMATION SYSTEM

GA ACCIDENT STATISTICAL SUMMARY-GA QUARTERLY REPORTS AND MONTHLY REPORTS

General Aviation and Flight Standards District Office Responses

| Data Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| GA Quarterly | | | | | | |
| a. Operation/injury/pilot FS-8020-40 | 3 | 12 | 16 | 10 | 1 | 10 (a) (b) |
| b. Phase of flight/Region FS-8020-39 | 3 | 18 | 15 | 6 | 1 | 11 (a) |
| c. Type accident FS-8020-40 | 6 | 19 | 11 | 4 | 1 | 11 (a) |
| d. Operation cause factor FS-8020-38 | 14 | 13 | 11 | 3 | 1 | 11 (a) |
| e. Technical cause factor FS-8020-37 | 11 | 13 | 13 | 4 | 1 | 11 (a) |
| GA Monthly | | | | | | |
| a. GA Accident master FS-8020-29 | 5 | 7 | 16 | 10 | 2 | 11 (a) |
| b. Make/model FS-8020-32 | 5 | 9 | 15 | 10 | 2 | 11 (a) |
| c. Region/District FS-8020-30 | 4 | 8 | 16 | 10 | 2 | 12 (a) |
| d. Cause factor FS-8020-31 | 14 | 13 | 8 | 7 | 2 | 12 (a) |
| e. Fatals FS-8020-43 | 1 | 11 | 15 | 8 | 2 | 10 (a) |

(a)---If I knew what was available
(b)---If I could get it

NTSB ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA---U.S. GENERAL AVIATION

UTILITY OF INJURY INDEX VS ANOTHER VARIABLE

General Aviation and Flight Standards District Office Responses

| Variable | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type of Accident | 12 | 15 | 20 | 11 | 3 | 2 (a) |
| 2. Phase of Operation | 12 | 17 | 18 | 10 | 3 | 2 (a) |
| 3. Kind of Flying | 12 | 11 | 23 | 10 | 4 | 2 (a) |
| 4. State of Occurrence | 5 | 7 | 21 | 16 | 7 | 2 (a) |
| 5. Type of Weather | 17 | 12 | 18 | 10 | 3 | 2 (a) |
| 6. Month of Occurrence | 3 | 6 | 29 | 14 | 6 | 2 (a) |
| 7. Light Conditions | 3 | 14 | 29 | 12 | 3 | 2 (a) |
| 8. Pilot Certificate | 6 | 9 | 25 | 17 | 5 | 2 (a) |
| 9. Pilot Age | 4 | 6 | 25 | 18 | 4 | 2 (a) |
| 10. Type of Aircraft | 5 | 15 | 27 | 11 | 4 | 2 (a) |
| 11. Type of Power | 3 | 6 | 27 | 14 | 6 | 2 (a) |
| 12. Type of Flight Plan | 2 | 5 | 26 | 17 | 6 | 2 (a) |
| 13. Airport Proximity | 3 | 6 | 29 | 16 | 4 | 2 (a) |
| 14. Fire After Impact | 3 | 7 | 31 | 15 | 3 | 2 (a) |

(a)---Little relation between degree of injury and accident cause

## UTILITY OF THESE TYPES OF FLYING EACH PLOTTED AGAINST ALL POSSIBLE CAUSE FACTORS

### General Aviation and Flight Standards District Office Responses

| Type of Flying | Most Useful | Very Useful | Useful | Little Use | NO Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Broad Cause Factors | 12 | 11 | 20 | 4 | 1 | 2 (a) |
| 2. Instructional Flying | 16 | 13 | 21 | 10 | 1 | 2 (a) |
| 3. Pleasure Flying | 15 | 14 | 17 | 10 | 1 | 2 (a) |
| 4. Business Flying | 11 | 16 | 19 | 11 | 1 | 2 (a) |
| 5. Corporate/Executive Flying | 10 | 16 | 21 | 13 | 1 | 2 (a) |
| 6. Aerial Applications | 11 | 8 | 24 | 12 | 3 | 2 (a) |
| 7. Air Taxi | 17 | 11 | 21 | 11 | 1 | 2 (a) |

### Utility of Aircraft Damage Vs These Varables

| Variable | Most Useful | Very Useful | Useful | Little Use | NO Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type of Accident | 7 | 13 | 24 | 11 | 3 | 2 |
| 2. Phase of Operation | 8 | 16 | 22 | 10 | 3 | 2 |
| 3. Kind of Flying | 7 | 16 | 23 | 11 | 3 | 2 |

(a)---If I knew what was available

NTSB BRIEF FORMAT OF AIRCRAFT ACCIDENT DATA---U.S. CIVIL AVIATION

General Aviation and Flight Standards District Office Responses

| Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type Aircraft vs. Light Conditions | 2 | 6 | 27 | 19 | 3 | 3 (a) (b) |
| 2. Kind of Flying vs. Pilot Certificate | 5 | 16 | 26 | 8 | 4 | 4 (a) (b) |
| 3. Kind of Flying vs. Injury Index | 2 | 7 | 24 | 18 | 5 | 3 (a) (b) |
| 4. Type of Accident vs. Injury Index | 2 | 10 | 25 | 17 | 5 | 4 (a) (b) |
| 5. Type of Accident vs. Aircraft Damage | 4 | 7 | 29 | 14 | 5 | 3 (a) (b) |
| 6. Type of Accident vs. Pilot Certificate | 6 | 12 | 23 | 14 | 3 | 3 (a) (b) |
| 7. Operational Phase vs. Injury Index | 6 | 14 | 24 | 15 | 3 | 4 (a) (b) |
| 8. Crew and Passengers vs. Injury Level for Aircraft Category | 2 | 4 | 24 | 22 | 7 | 3 (a) (b) |
| 9. Injuries vs. Type Accident | 2 | 9 | 20 | 21 | 4 | 4 (a) (b) |
| 10. Injuries vs. Type Flying | 2 | 12 | 20 | 20 | 3 | 4 (a) (b) |
| 11. Number of Accidents For Each Cause Factor | 12 | 13 | 17 | 11 | 4 | 4 (a) (b) |

(a)---If I knew what was available
(b)---If I could get it

PUBLICATIONS USED FAMILIARITY, AVAILABILITY, AND USE

Regional Office Responses

| | Familiarity | | | Availability | | Use | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total Response | Have Seen | Never Seen | Receive | No | Daily | Weekly | Monthly | Yearly | Never |
| **FAA** | | | | | | | | | | |
| 1. OKC Monthly | 9 | 7 | 2 | 6 | 1 | - | 1 | 3 | - | 3 |
| 2. OKC Quarterly | 9 | 7 | 2 | 6 | 1 | - | 1 | 4 | - | 2 |
| 3. OKC Special | 8 | 6 | 2 | 4 | 1 | - | - | 3 | - | 2 |
| **NTSB** | | | | | | | | | | |
| 1. Air Carrier Annual Review | 8 | 7 | 1 | 6 | 2 | - | - | 3 | 4 | 1 |
| 2. General Aviation Annual Review | 10 | 10 | - | 9 | 1 | - | - | 2 | 5 | 2 |
| 3. Bimonthly Briefs | 8 | 6 | 2 | 4 | 2 | - | - | 3 | 4 | 0 |
| 4. Major Accident Board Report | 10 | 10 | - | 6 | 1 | - | - | 2 | 4 | 0 |
| 5. Special Study | 7 | 7 | 2 | 3 | 1 | - | - | 3 | 2 | 1 |
| **ICAO** | | | | | | | | | | |
| 1. Monthly Summary | 8 | - | 8 | - | - | - | - | - | - | 5 |
| 2. Prelim Reports | 8 | - | 8 | - | - | - | - | - | - | - |
| 3. Full Reports | - | - | - | - | - | - | - | - | - | - |

FAA ACCIDENT INFORMATION SYSTEM

GA ACCIDENT STATISTICAL SUMMARY (ANNUAL) FS-8020-21

Regional Office Responses

| Data Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| Overall summary | 3 | 3 | - | 2 | - | |
| Personal acts | 2 | 1 | 3 | 3 | - | |
| Technical factors | 1 | 2 | 4 | 2 | - | |
| Types of accidents | 2 | 3 | 3 | 1 | - | |
| Make/model | 2 | - | 4 | 2 | - | |
| By region | 4 | 2 | 2 | 1 | 1 | |
| Air taxi by make/model | 1 | - | 3 | 4 | 1 | |
| Air taxi by cause | 2 | 2 | 1 | 4 | - | |
| Charts | | | | | | |
| Factor cities | 2 | 1 | 3 | 3 | - | |
| Phase of flight | 2 | 2 | 3 | 2 | - | |
| Activity involved | 1 | 3 | 3 | 1 | 1 | |
| Pilot certificate | 2 | 1 | 4 | 2 | - | |
| Rates/fatal | 2 | 4 | 2 | 1 | - | |

FAA ACCIDENT INFORMATION SYSTEM

GA ACCIDENT STATISTICAL SUMMARY-GA QUARTERLY REPORTS AND MONTHLY REPORTS

Regional Office Responses

| Data Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| GA Quarterly | | | | | | |
| a. Operation/injury/pilot FS-8020-40 | 1 | 1 | 1 | 4 | 1 | 2 (a) (b) |
| b. Phase of flight/Region FS-8020-39 | 1 | 1 | 3 | 3 | - | 2 (a) (b) |
| c. Type accident FS-8020-40 | 1 | 1 | 3 | 3 | - | 2 (a) (b) |
| d. Operation cause factor FS-8020-38 | 1 | 2 | 2 | 3 | - | 2 (a) (b) |
| e. Technical cause factor FS-8020-37 | - | - | 3 | 4 | - | 2 (a) (b) |
| GA Monthly | | | | | | |
| a. GA accident master FS-8020-29 | - | - | 2 | 3 | 2 | 2 (c) (d) |
| b. Make/model FS-8020-32 | - | - | 1 | 4 | 3 | 2 (c) (d) |
| c. Region/District FS-8020-30 | 2 | 1 | - | 4 | 1 | 2 (c) (d) |
| d. Cause factor FS-8020-31 | 1 | 1 | 2 | 3 | 1 | 2 (c) (d) |
| e. Fatals FS-8020-43 | 2 | 1 | - | 4 | 1 | 2 (c) (d) |

(a)-If we ever saw them
(b)-Make current quarterly reports for the number of tallys at the year end
(c)-The only one they get is 8020-44
(d)-All these have useful data but little value because data, esp. total is 3 to 4 months old. End of year printed following March is useful. Prefer contactions rather than symbols and smaller pages for easier copy for field officer.

NTSB ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA---U.S. GENERAL AVIATION

UTILITY OF INJURY INDEX VS ANOTHER VARIABLE

Regional Office Responses

| Variable | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type of Accident | 1 | 2 | 5 | 2 | 1 | - |
| 2. Phase of Operation | 2 | 3 | 3 | 2 | 1 | - |
| 3. Kind of Flying | 2 | 2 | 4 | 2 | 1 | - |
| 4. State of Occurrence | 1 | 1 | 4 | 3 | 2 | - |
| 5. Type of Weather | 1 | 2 | 4 | 3 | 1 | - |
| 6. Month of Occurrence | 2 | - | 4 | 3 | 2 | - |
| 7. Light Conditions | 1 | - | 7 | 1 | 2 | - |
| 8. Pilot Certificate | - | - | 7 | 2 | 2 | - |
| 9. Pilot Age | - | - | 5 | 3 | 2 | - |
| 10. Type of Aircraft | 1 | 1 | 5 | 2 | 2 | - |
| 11. Type of Power | - | - | 4 | 3 | 3 | - |
| 12. Type of Flight Plan | - | - | 6 | 1 | 4 | - |
| 13. Airport Proximity | - | - | 7 | 2 | 2 | - |
| 14. Fire After Impact | - | - | 5 | 4 | 2 | - |

NTSB---ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA--U.S. GENERAL AVIATION

UTILITY OF THESE TYPES OF FLYING EACH PLOTTED AGAINST ALL POSSIBLE CAUSE FACTORS

Regional Office Responses

| Type of Flying | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Broad Cause Factors | 3 | 3 | 2 | 2 | - | - |
| 2. Instructional Flying | 1 | 6 | 2 | 1 | - | - |
| 3. Pleasure Flying | 2 | 5 | 2 | 1 | - | 1 (a) |
| 4. Business Flying | 2 | 4 | 3 | 1 | - | 1 (a) |
| 5. Corporate/Executive Flying | 1 | 2 | 5 | 1 | 1 | - |
| 6. Aerial Applications | 2 | 3 | 3 | 1 | 1 | - |
| 7. Air Taxi | 2 | 5 | 2 | 1 | - | 1 (a) |

Utility of Aircraft Damage Vs These Varables

| Variable | | | | | | |
|---|---|---|---|---|---|---|
| 1. Type of Accident | 1 | 1 | 4 | 4 | 1 | - |
| 2. Phase of Operation | 2 | 1 | 3 | 4 | 1 | - |
| 3. Kind of Flying | 1 | 2 | 4 | 3 | 2 | - |

(a)---If I knew what was available

NTSB BRIEF FORMAT OF AIRCRAFT ACCIDENT DATA---U.S. CIVIL AVIATION

ACCIDENT CORRELATIONS

Regional Office Response

| Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type of Aircraft vs. Light Conditions | - | 1 | 3 | 5 | 1 | - |
| 2. Kind of Flying vs. Pilot Certificate | - | 2 | 3 | 5 | - | - |
| 3. Kind of Flying vs. Injury Index | 1 | - | 2 | 6 | 1 | - |
| 4. Type of Accident vs. Injury Index | 1 | - | 3 | 5 | 1 | - |
| 5. Type of Accident vs. Aircraft Damage | - | - | 4 | 5 | 1 | - |
| 6. Type of Accident vs. Pilot Certificate | - | 2 | 3 | 6 | - | - |
| 7. Operational Phase vs. Injury Index | 1 | 1 | 1 | 5 | 1 | - |
| 8. Crew and Passengers vs. Injury Level for Aircraft Category | - | - | 4 | 4 | 2 | - |
| 9. Injuries vs. Type Accident | 1 | 1 | 2 | 4 | 2 | - |
| 10. Injuries vs. Type Flying | 1 | 1 | 2 | 4 | 2 | - |
| 11. Number of Accidents For Each Cause Factor | 1 | 1 | 2 | 4 | 2 | - |

PUBLICATIONS USED—FAMILIARITY, AVAILABILITY, AND USE

Air Carrier District Office Responses

| | Familiarity | | | Availability | | Use | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total Response | Have Seen | Never Seen | Receive | No | Daily | Weekly | Monthly | Yearly | Never |
| **FAA** | | | | | | | | | | |
| 1. OKC Monthly | 7 | 5 | 2 | – | 5 | – | – | – | 1 | 3 |
| 2. OKC Quarterly | 7 | 5 | 2 | – | 5 | – | – | – | 1 | 3 |
| 3. OKC Special | 7 | 4 | 3 | – | 5 | – | – | – | 1 | 3 |
| **NTSB** | | | | | | | | | | |
| 1. Air Carrier Annual Review | 6 | 6 | – | 6 | – | – | – | 3 | 2 | 1 |
| 2. General Aviation Annual Review | 7 | 7 | – | 6 | 1 | – | – | – | 3 | 4 |
| 3. Bimonthly Briefs | 7 | 5 | 2 | 2 | 4 | – | – | 1 | 1 | 4 |
| 4. Major Accident Board Report | 7 | 7 | – | 6 | – | – | – | 1 | 3 | 1 |
| 5. Special Study | 7 | 7 | – | 4 | 2 | – | – | 1 | 3 | 2 |
| **ICAO** | | | | | | | | | | |
| 1. Monthly Summary | 7 | 3 | 4 | – | 4 | – | – | – | 1 | 3 |
| 2. Prelim Reports | 7 | 2 | 5 | – | 4 | – | – | – | – | 3 |
| 3. Full Reports | 7 | 4 | 3 | – | 4 | – | – | – | 1 | 3 |
| 4. Special Study | 7 | 3 | 4 | – | 4 | – | – | – | – | 3 |

FAA ACCIDENT INFORMATION SYSTEM

GA ACCIDENT STATISTICAL SUMMARY (ANNUAL) FS-8020-21

Air Carrier District Office Responses

| Data Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| Overall summary | 1 | - | - | 2 | 2 | - |
| Personal acts | 1 | - | 1 | 2 | 2 | - |
| Technical factors | 1 | - | 1 | 2 | 2 | - |
| Types of accidents | 1 | - | 1 | 2 | 2 | - |
| Make/model | 1 | - | 1 | 2 | 2 | - |
| By region | - | - | 1 | 3 | 2 | - |
| Air taxi by make/model | - | - | 3 | 1 | 2 | - |
| Air taxi by cause | - | - | 3 | 1 | 2 | - |
| Charts | | | | | | |
| Factor cities | - | - | 2 | 1 | 3 | - |
| Phase of flight | - | - | 2 | 1 | 3 | - |
| Activity involved | - | - | 2 | 1 | 3 | - |
| Pilot certificate | - | - | 2 | 1 | 3 | - |
| Rates/fatal | - | - | 2 | 1 | 3 | - |

FAA ACCIDENT INFORMATION SYSTEM

GA ACCIDENT STATISTICAL SUMMARY-GA QUARTERLY REPORTS AND MONTHLY REPORTS

Air Carrier District Office Responses

| Data Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| GA Quarterly | | | | | | |
| a. Operation/injury/pilot FS-8020-40 | - | - | - | 3 | 3 | - |
| b. Phase of flight/Region FS-8020-39 | - | - | - | 3 | 3 | - |
| c. Type accident FS-8020-40 | - | - | 1 | 3 | 2 | - |
| d. Operation cause factor FS-8020-38 | - | - | 1 | 3 | 2 | - |
| e. Technical cause factor FS-8020-37 | - | - | 1 | 3 | 2 | - |
| GA Monthly | | | | | | |
| a. GA accident master FS-8020-29 | - | - | - | 2 | 4 | - |
| b. Make/model FS-8020-32 | - | - | - | 3 | 3 | - |
| c. Region/District FS-8020-30 | - | - | - | 3 | 3 | - |
| d. Cause factor FS-8020-31 | - | - | - | 4 | 2 | - |
| e. Fatals FS-8020-43 | - | - | 1 | 2 | 3 | - |

NTSB ANNUAL REVIER OF AIRCRAFT ACCIDENT DATA---U.S. GENERAL AVIATION

UTILITY OF INJURY INDEX VS ANOTHER VARIABLE

Air Carrier District Office Responses

| Variable | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type of Accident | 1 | - | 1 | 2 | 3 | - |
| 2. Phase of Operation | 1 | - | 1 | 2 | 3 | - |
| 3. Kind of Flying | 1 | - | 1 | 2 | 3 | - |
| 4. State of Occurrence | - | - | 2 | 2 | 3 | - |
| 5. Type of Weather | 1 | - | 1 | 2 | 3 | - |
| 6. Month of Occurrence | - | - | 2 | 2 | 3 | - |
| 7. Light Conditions | 1 | - | 1 | 2 | 3 | - |
| 8. Pilot Certificate | 1 | - | 1 | 2 | 3 | - |
| 9. Pilot Age | 1 | - | 1 | 2 | 3 | - |
| 10. Type of Aircraft | 1 | 1 | 1 | 3 | 1 | - |
| 11. Type of Power | 1 | - | 1 | 3 | 2 | - |
| 12. Type of Flight Plan | - | - | 2 | 2 | 3 | - |
| 13. Airport Proximity | - | 1 | 1 | 2 | 3 | - |
| 14. Fire After Impact | - | 1 | 2 | 2 | 2 | - |

NTSB---ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA--U.S. GENERAL AVIATION

UTILITY OF THESE TYPES OF FLYING EACH PLOTTED AGAINST ALL POSSIBLE CAUSE FACTORS

Air Carrier District Office Responses

| Type of Flying | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Broad Cause Factors | - | 2 | 2 | - | 3 | - |
| 2. Instructional Flying | - | 2 | 2 | - | 3 | - |
| 3. Pleasure Flying | - | 2 | 2 | - | 3 | - |
| 4. Business Flying | - | 2 | 2 | - | 3 | - |
| 5. Corporate/Executive Flying | - | 2 | 2 | - | 3 | - |
| 6. Aerial Applications | - | 2 | 1 | 1 | 3 | - |
| 7. Air Taxi | - | 2 | 3 | - | 2 | - |

Utility of Aircraft Damage Vs These Varables

| Variable | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type of Accident | - | 1 | 2 | 4 | - | - |
| 2. Phase of Operation | - | 1 | 1 | 4 | 1 | - |
| 3. Kind of Flying | - | 1 | 1 | 4 | 1 | - |

NTSB BRIEF FORMAT OF AIRCRAFT ACCIDENT DATA---U.S. CIVIL AVIATION

ACCIDENT CORRELATIONS

Air Carrier District Office Responses

| Presentations | Most Useful | Very Useful | Useful | Little Use | No Use | Would Use If |
|---|---|---|---|---|---|---|
| 1. Type Aircraft vs. Light Conditions | - | - | 1 | 3 | 3 | - |
| 2. Kind of Flying vs. Pilot Certificate | - | - | 1 | 3 | 3 | - |
| 3. Kind of Flying vs. Injury Index | - | - | 1 | 3 | 3 | - |
| 4. Type of Accident vs. Injury Index | - | - | 2 | 3 | 2 | - |
| 5. Type of Accident vs. Aircraft Damage | - | - | 1 | 3 | 3 | - |
| 6. Type of Accident vs. Pilot Certificate | - | - | 1 | 3 | 3 | - |
| 7. Operational Phase vs. Injury Index | - | - | 1 | 4 | 3 | - |
| 8. Crew and Passengers vs. Injury Level for Aircraft Category | - | - | 1 | 3 | 2 | - |
| 9. Injuries vs. Type Accident | - | - | 1 | 3 | 3 | - |
| 10. Injuries vs. Type Flying | - | - | 1 | 3 | 3 | - |
| 11. Number of Accidents For Each Cause Factor | - | - | 1 | 3 | 3 | - |

APPENDIX D

PRECEEDINGS OF THE

AOPA AIR SAFETY FOUNDATION
and
GENERAL AVIATION MANUFACTURERS ASSOCIATION

GENERAL AVIATION SAFETY WORKSHOP

THE OHIO STATE UNIVERSITY, COLUMBUS, OHIO
JANUARY 30-31, 1979

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## INTRODUCTION

On January 30-31, 1979, the AOPA Air Safety Foundation and the General Aviation Manufacturers Association sponsored a two-day workshop for the purpose of improving the safety record of general aviation. The workshop was hosted by The Ohio State University and was attended by representatives of the various airframe, avionics, and engine manufacturers, aviation associations, educational institutions, FAA, insurance companies, National Safety Council, National Weather Service, NASA and NTSB.

Six different areas of concern were identified and working groups were formed to discuss the following issues: FAA regulations and procedures, proficiency and recurrent training, the flight instructor, pilot written examinations, weather-related accidents, and aircraft accident data. Each of the six groups discussed methods of improving safety within the specific area of concern, and were asked to identify any additional areas which required analysis for safety improvements.

The individual objectives for the accident data group are listed below:

Is the present method of data collection used by NTSB sufficient?

Is the data classification appropriate and useful?

How can aircraft accident data be made more useful for the aviation community?

How should NASA's Aviation Safety Reporting program be best utilized to further aviation safety?

BACKGROUND.

Due to the size of this group, three ad hoc committees were established. The first ad hoc committee addressed the question of how the present method of data collection used by the National Transportation Safety Board, (NTSB), might be improved. The second ad hoc group addressed the issue of how the NTSB data classification system could be made more useful to the aviation community and last, but not least, the third ad hoc group looked at the issue of how NASA's Aviation Safety Reporting System (ASRS), could be best utilized to further aviation safety. The following are the consolidated recommendations of this group:

Need to "Focus in" on More of the Human Elements/Factors Surrounding an Accident: "Pilot error" is cited as the cause of many accidents and has become a catch-all phrase which conveys little information. It was recommended that a study be conducted to define pertinent items to be included in the data in order to learn something about the why of pilot error. A "cause profile" might prove to be more meaningful. The pilot's state of mind and responses at various stages in the event should be reported. The chronology of events which led

to the accident, the pilot's past experience, stress factors, cockpit workload, etc., are critically important. More attention needs to be devoted to accidents in which the pilot survives to determine some of these answers. Furthermore, the pilot's input should be solicited and heeded. There should be more freedom for information exchange, between both the pilot and ATC, as well as with FAA and NTSB, after an accident or incident, if the emphasis were placed on improving air safety, i.e., identifying, then eliminating the causative factors, rather than purely assigning blame. This is not to imply, however, that ATC, FAA and NTSB necessarily should restructure their investigative priorities but, rather, that this is the typical pilot's perception of their priorities, and that this image should be dealt with in order to improve the "flow" of investigative information back to the various agencies.

Needed: A Better Way to Notify "Parties" After an Accident: It was suggested that NTSB, FAA, and GAMA arrange a meeting to discuss strategies for notifying industry representatives when their products were involved in an accident. The mechanism for notification of whom, by whom and when, should be established. There is technical investigative expertise available in the industry which, in some cases, is not being utilized to full advantage in accident investigations.

Need for a Centralized Location to Store, then Disseminate Accident Data: Data for accidents currently under investigation and analysis should be collected and stored in a central location, along with a uniform method of dissemination of information in order to avoid publication of conflicting information, based on the same raw data. Perhaps this could be best accomplished by a private organization funded by NTSB.

Need for Better "Rate" and "Other" Data: Since statistics are usually stated in terms of percentages, or "rates," more attention needs to be devoted to the determination of the proper denominators. Much information exists, but its accuracy is almost continuously subject to question. The committee suggested a procedure which should be implemented at aircraft maintenance facilities and would require those facilities to report the number of hours flown for each aircraft serviced. The report would take the form of a postcard to be submitted when the annual maintenance or first progressive segment of a periodic inspection is performed and would include:

Type of aircraft,

Total number of hours flown since the last annual, and

Type (or types) of activity in which the aircraft was engaged in during those hours (e.g., business travel, 50%; personal travel, 30%; training, 20%).

This procedure would require maintenance facilities to supply the data with input from the aircraft owner. Suggested frequency would be after each annual and would be compiled on a yearly basis. The present method of determining these figures should be continued as long as necessary in order to provide a means of correlating the new data with the old. In addition

to the above data, better raw data on the number of active pilots and the number of active aircraft in the fleet is required. This information, as well as improved hours flown by classification data, should be provided to the NTSB and the aviation community by FAA.

An Alternative to "Accidents Per Passenger Mile". It was recommended that the practice of reporting general aviation accidents per passenger mile be discontinued. A more meaningful measure might be the number of accidents per departure or, perhaps, per passenger departure.

An "Improved" Method of Data Classification: The following classification system (Table D-1) is an attempt to categorize aircraft accidents by use, rather than under the general heading of either air carrier or general aviation accidents. For example, a private aircraft flown for personal transportation from point A to point B would be listed under "Personal." The same aircraft flown from point A to point B for business conducted at or performed during the process of going "to" or "from" that destination, would be classified as "Business Travel." Public aircraft would be defined as those aircraft owned and/or operated by the FAA, by Federal or State Government agencies, etc. Military aircraft would be excluded. The "Other" category would include only those aircraft accidents which resulted from theft, illegal transportation of drugs and other similar uses over which no control is possible. By segregating accidents in this manner, it would be much easier to identify the risk areas and focus corrective action on those segments of civil aviation which need help.

Need for Standardization of Terms and Definitions: Standardization of terms and definitions used in the various aircraft accident classifications proposed in Table D-1 is required to enable both the FAA and NTSB to accurately place each accident in the appropriate category.

NASA's Safety Reporting Program; the Need for "Trend Data" Analyses: The NASA Safety Reporting Program has been in existence since mid-1976 and now has, in its data base, approximately 13,000 separate reports. So far, completed studies which have utilized this data base have dealt with fairly specific situations, as exemplified by the several excellent special reports already published in the ASRS Quarterly Reports. In view of the number of raw data reports now available and in the data base, it was the group's concensus that the data should now be used for "trend data" analyses. Findings from this work should be made available to the entire aviation community, both for the purposes of communicating the information, as well as to provide a sound data base from which corrective action could be developed to reduce airplane accidents where the trend data shows existing problem areas.

Publicize Both the Existence and Potential Research Uses of ASRS: The group believed that the aviation public, insurance companies, support managers, and the aviation media are not aware of, and consequently do not use to the fullest extent, the data base stored in the ASRS data bank. The group recommended that a public relations effort be initiated by NASA to help create greater public awareness of the ASRS Program--specifically, its existence and potential research uses.

The present ASRS Quarterly Reports are not available for review by most general aviation pilots. (These reports were never intended for widespread distribution.) Follow-up action, therefore, is required to develop/repackage this material in some sort of readable form that would be widely read by most pilots. The objective/goal of such a program would be as follows:

"Learn from the experience of others--both the good and the bad. There is no need to duplicate the mistakes of others."

Combine the NASA and FAA Safety Reporting Programs: Although administered independently, FAA's Safety Improvement Program is similar in scope and purpose to that of NASA's Aviation Safety Reporting System. Since the FAA's program does not have an immunity clause (which is believed to stimulate greater report submission), it is recommended that FAA consider such a clause in their program to stimulate greater participation. Alternatively, perhaps both the FAA and NASA programs could be merged together or perhaps, at a minimum, they could share a common data base so that deficiencies and other safety problems, identified under both programs, but particularly the NASA program, can be quickly brought to the attention of and hopefully corrected by the FAA.

TABLE D-1. PROPOSED NEW METHOD OF AIRCRAFT DATA CLASSIFICATION CIVIL AVIATION

<u>Air Carrier</u>

- Scheduled
- Supplemental
- Commuter
- Contract

<u>Corporate/Executive</u>

<u>Business Travel</u>

<u>Personal</u>

- Local
- Point-to-point

<u>Air Taxi</u>

<u>Travel Clubs</u>

<u>Public Aircraft</u>

<u>Training</u>

- Dual
- Supervised Solo
- Qualification
- Proficiency

<u>Specialized Application</u>

- Agriculture
- Fish Spotting
- Fire Fighting
- Pipeline
- Advertising
- Remote Delivery
- Glider Towing
- Sky Diving
- Aerobatics
- Competition
- Sight-seeing

<u>Other</u>

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